

Living Mammals *OF THE WORLD In Color*



LIVING MAMMALS OF THE WORLD IN COLOR

By IVAN T. SANDERSON

LIVING MAMMALS OF THE WORLD IN COLOR is an exciting expedition into the lives, the habits and the homes of every major family of mammals in all parts of the earth.

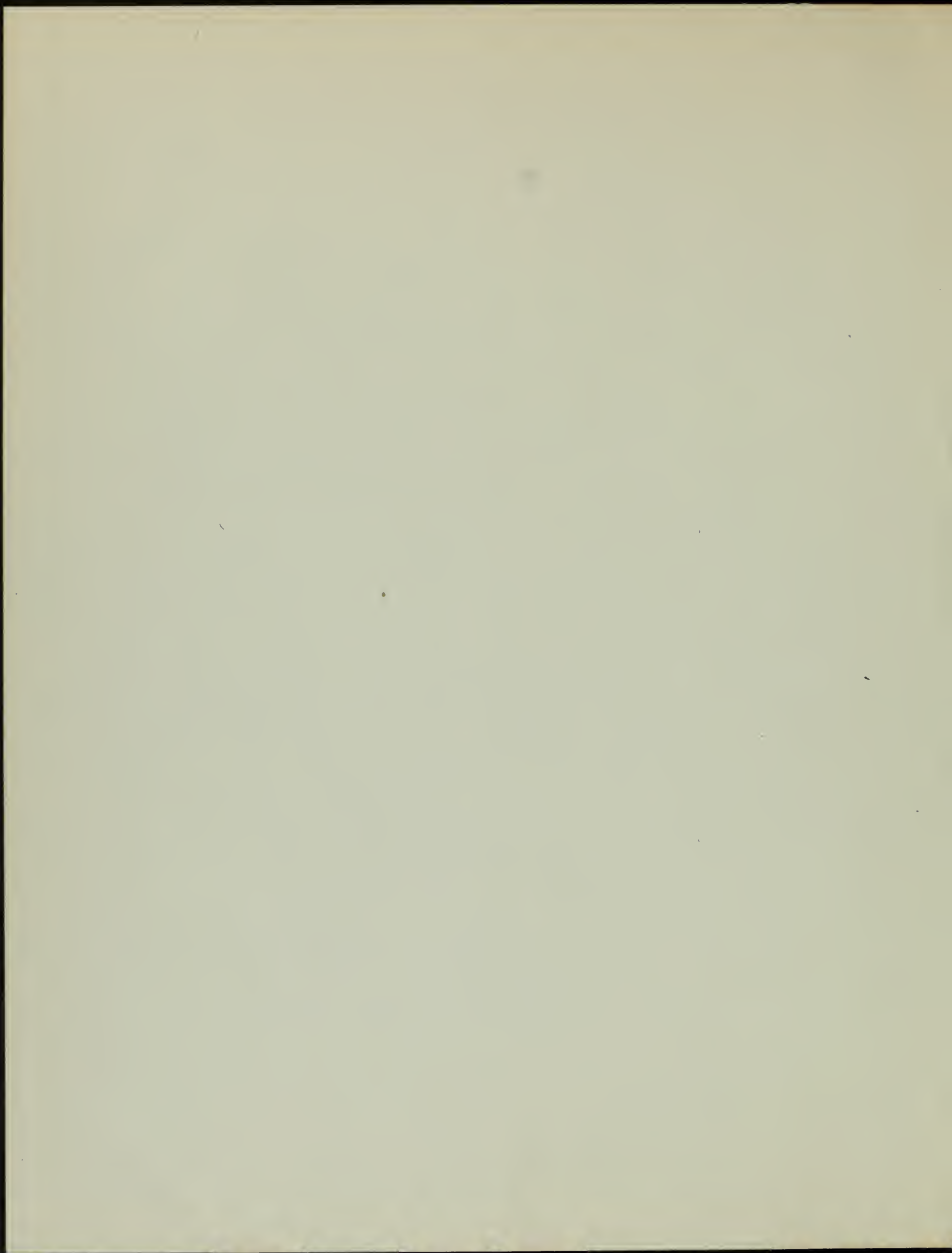
Guided by a comprehensive, fact-packed text, accompanied by 189 vivid, full-color photographs, the reader is taken on a thrilling and comprehensive exploration of mammal wildlife. Mr. Sanderson is a famous zoologist, whose participation in numerous expeditions, extensive research, and observations on the large collection in his own private zoo have contributed to the extensive, accurate information in this book.

The color illustrations represent the utmost achievements of some of the outstanding photographers of animal life, including Ylla, Roy Pinney, Cy La Tour, John Markham and Van Nostrand. These photographs, made for the most part under natural wildlife conditions, add immeasurably to the descriptions of the living mammals by showing their true colors, distinctive positions, and other details that make each picture a character portrait.

Continued on back flap

JACKET PHOTOGRAPHS:

LION ON FRONT OF JACKET BY CY LA TOUR;
COLOMBIAN DOUROUCOLI ON BACK OF JACKET
BY ROY PINNEY



*Living Mammals
of the World
in Color*



Living Mammals

OF THE WORLD

IN COLOR

by

IVAN T. SANDERSON

A Treasury of Real-Life, Natural-Color
Photographs and Complete Up-to-Date,
Accurate Description of 189 Mammals
Based on *Living Mammals of the World*

HANOVER HOUSE • GARDEN CITY • NEW YORK



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*Living Mammals
of the World
in Color*

Photographs by

JOHN MARKHAM

ROY PINNEY

CY LA TOUR

YLLA

VAN NOSTRAND

ERNEST P. WALKER

and others



Introductory

THE Mammals are the most highly evolved and the most important group of animals, at least from the human point of view. Without them, and particularly the domesticated species, Man would probably not be able to survive. Without some of them—many of which are virtually unknown to all except zoologists—we would certainly have to alter our entire mode of living and we might very well succumb in the face of hordes of insects. Yet curiously, although everybody is conversant with the terms fish, reptile, or bird, there is no really popular name for the form of life we are about to describe. The trend today among English-speaking peoples seems to be to call them simply *animals* in a contrasting sense to the terms fish, birds, reptiles, and so forth. This is very misleading and is not to be recommended, first because all material things that are not, as the old parlor game had it, vegetables or minerals are animals, and secondly because science has adopted this word to define a particular group of living things. The Mammals are but one rather minor subdivision of the Kingdom of Animals. Apart from the name *Beasts*, as used in its old and pure sense, none of the other numerous designations such as Quadrupeds, Furred Animals, and so forth that have been applied to this group is any longer valid as a comprehensive title for the Mammals.

It would at first appear that everybody should know what is or is not a Mammal and be able to differentiate them from all other animals. However, this is not so, and until very recently even our Courts of Law were far from sure of the status of several whole groups of Mammals—notably, the Whales, which they ruled were fish. It is interesting to note that even today the U.S. Customs requires shippers of live animals to declare whether they are importing “Birds” or “Backboned Animals,” and that the duty is different on each. Despite these confusions, Mammals can nonetheless be clearly defined, and in a fairly simple manner, for there are three characteristics that they alone display in combination.

No other animals, at the same time, have true hairs, produce milk with which to feed their young, and have four-chambered hearts. What is more, with one exception—the matter of hair, which is lacking in some Whales—all Mammals display these three features, for even the Monotremes that—surprisingly for Mammals—lay eggs, produce milk and suckle their young. In addition, all Mammals breathe air and have warm blood and



vertebrated backbones. However, they share these three features with the birds; and the reptiles and amphibians also breathe air, though the latter do so only in their adult stages. A vertebrated backbone is common also to the fish.

As we mentioned above, the Mammals in reality constitute only a rather minor subdivision of the Animal Kingdom. There are about one million known kinds of animals living on this planet at the present time. Half of these are Insects, and entomologists believe that we have so far discovered only about a tenth of the existing species of these. Of the other half-million animals, about a fifth are backboned or Vertebrates; and of these some 12,000 are Mammals. Nobody has actually counted all the known kinds of Mammals for the simple reason that we still do not know just where to draw the line between a *species* on the one hand and mere subspecies, or even individual variations on the other. Thus, until we have a great deal more information about the range of variation of all kinds, among populations of Mammals in their natural habitat, we will not be able to say just how many specific kinds inhabit our earth.

Next to their number, perhaps the most outstanding feature of the Mammals as a whole is their extraordinary range of size, shape, and habits. In these respects they are unique among all groups of animals, and par-

ticularly among the Vertebrates. Fish range in size from creatures not much bigger than a housefly to the monstrous Whale-Shark, and may be short or long and either circular in section or flattened from top to bottom or from side to side, but they are all built on much the same basic plan. Amphibians come in only three forms—the frogs, salamanders, and the legless, wormlike Coecilians. Reptiles also come in only three general shapes—the snakelike, tortoiselike, and lizardlike. Birds are really all the same beneath the skin, although some have almost lost their wings. But Mammals come in dozens of completely different forms. There are fishlike ones—the whales; birdlike kinds—the bats; lizardlike—certain tiny Australian marsupial-mice; froglike—Men; tortoiselike—armadillos; and innumerable forms that almost defy description—such as the Pangolins and the Sand-Puppies. They range in size from a shrew that just counterbalances a dime, to the Blue Whale, which has been measured at 113 feet and can weigh as much as 170 tons.

In habits, also, the Mammals are incredibly varied. They are found throughout the earth, in the air above it, under its surface, in rivers, lakes, seas, and oceans, and on completely waterless deserts and frozen icecaps. In fact, they have a wider distribution and are more adaptable than any other group of animals except possibly the spiders and their allies. Because of their warm blood, and their extremely efficient mechanism for maintaining its temperature both in considerable heat or in excessive cold, and also because of their varied methods of insulating their bodies, they are able to survive in a variety of environments that are lethal to almost all other animals. It has now been discovered experimentally that not only Mammalian tissue but even whole animals can be literally frozen stiff for days and then be revived, but that the same animals can in some cases also survive temperatures that will bake pottery. One of the most adaptable of all Mammals, moreover, is Man, and this even without all his artificial aids to survival. The natives of Tierra del Fuego survived without clothes or houses in subzero temperatures and naked men have survived temperatures far above that of the hottest desert in full sunlight.

Mammals have also diversified greatly in another respect. This is known as phylogenetic diversification, which means, in other words, that they have a very large and complex family tree. Furthermore, they also display, over and over again within this family tree, what is known as adaptive radiation. Reduced to simplest terms, this means that a particular group of Mammals started

as generalized creatures but then branched out in various directions into all manner of unlike forms, each adapted to an entirely different way of life. Taking the Marsupials as an example, we find that the group contains a central, primitive core of opossumlike creatures but that from these have sprung animals like antelopes—the kangaroos; like wolves—the Thylacine; and like moles, squirrels, badgers, mice, jerboas, rabbits, and so forth. This process has taken place again and again among the Mammals throughout their comparatively long history on this earth.

When we say that the history of Mammals is a long one we are speaking in geological terms, for, although the Age of Mammals only began about sixty million years ago, there were tiny, primitive Mammals as long ago as 180 million years. During this immense span of time many more kinds of mammals were evolved and became extinct than have survived into the present, so that we are today left with, as it were, only the outer twigs of their family tree. This makes the classification of the Mammals a matter of considerable difficulty, for many of them that look alike today are in no way related, whereas many others that appear altogether different from one another prove, on anatomical investigation, to be close relatives. The purpose of this book is not only to describe many known kinds of living Mammals but also to display their relationships, and thus their origins.

Fortunately, there is a recognized procedure for doing this, which is known as *Systematics*. This, in the scientific sense, means arranging things according to their phylogenetic affinities or, in other words, their true position on a family tree. The Mammals could, of course, be classified in a number of other ways, as for instance by size, by habit, or geographically, by their place of origin, but in no arrangement other than the systematic can so many facts about their structure, origin, and relationships be assembled so readily. Classification, in fact, is not just a method of splitting up an unmanageable mass of things; it is also a way of bringing similar things together so that their interrelations may be comprehended. Science devoted the greater part of its time and energies during the past two centuries to the description, listing, and classification of all manner of things, material and otherwise. The science of Zoology is, in fact, founded on the systematic classification of animals, both living and extinct.

Most groups of animals have now been rather thoroughly described and many of them have been adequately classified. Among the latter are, and most for-

fortunately from our point of view, the Mammals, although even among them there is still considerable uncertainty as to many details, and some major problems as to their origin still remain to be solved. There is as a whole, however, now marked agreement as to their general arrangement and this has been embodied in masterly compacted form by G. Gaylord Simpson, of the American Museum of Natural History, in a publication entitled *The Principles of Classification and a Classification of the Mammals* (Bull. Am. Mus. Nat. Hist., 1945, Vol. 85). The particular value of this work, especially to students, is that it brings together both the living and the extinct forms in a single series and thus gives the most complete picture presently possible of this whole *Class* of animals, both in space and in time.

The arrangement of the Mammals adopted in this book is substantially that laid down by Dr. Simpson, but, for purposes of simplicity, the actual classification used is not in exact accord therewith. In order to arrange all known Mammals in an understandable manner, and especially when the extinct forms have to be taken into account, it is necessary to use a very complex system of classification—at least, if the results are to be properly scientific. It is, in fact, necessary to set up a large number of categories of various statuses or degrees of importance. Thus, the *Class Mammalia* has first to be split into several *Subclasses*, and then these, in turn, into categories named technically *Infraclasses*, *Cohorts*, *Superorders*, *Orders*, *Suborders*, *Infraorders*, *Superfamilies*, *Families*, *Subfamilies*, *Tribes*, *Subtribes*, *Genera*, *Subgenera*, and finally into *Species*, *Subspecies*, *Races*, *Clines*, and mere variations. Such a system is not only overwhelming to the nonspecialist, but unnecessarily cumbersome for our purposes and may therefore legitimately be reduced to a very simple structure.

As we are neither concerned in this book with the extinct forms of Mammals, nor with the technical details of classification *per se*, we have made use only of the minimum necessary to achieve our objective without, we hope, taking undue liberties with established procedure. In order to do this, it has been necessary to omit, though by no means to ignore, what is actually the greater part of the over-all classification of Mammals, as that is concerned with extinct forms.

To this end, we first divide all living Mammals into nineteen *Orders*, corresponding to those of the established scientific classification. Next, we subdivide each of these—except a few which consist of but one form of animal, like the Aard-Vark, or the Cobego—into two or more groups, to which purely artificial anglicized names

are given. These subdivisions are perfectly valid in every case but they display a variety of status in the scientific sense. Thus, the two major groups of Whales—the Baleen and the Toothed Whales—constitute true *Suborders*, whereas those herein entitled Bovines (cattle), Antelopines (antelopes), and Caprines (goats) of the Hoofed Mammals are really only of *Subfamily* rank. These subdivisions, however, represent the popular grouping of the Mammals.

Below this category we use only one further principal breakdown. This, on the whole, corresponds in the majority of cases to the *families* of Mammals, technically speaking, but it does not do so in all cases. In many instances the group thus designated is really only of *subfamily*, *generic* or even lesser status—e.g., an arbitrary classification like “The Not-so-Great Cats.” Those wishing to know the true scientific status of each group may determine them from the ending of the Latin name given to each. Thus, if the name ends in *-IDAE* it denotes a family; if in *-INAE* a subfamily. Group endings that are of lesser status are explained in each case.

Finally, within these “family” groups the animals are described more or less by *genera*, the number of species contained in each usually being mentioned. In some cases these headings represent groups of genera—e.g., the Voles, in which no less than two dozen recognized genera are covered by one head. Only in the case of certain large and well-known types such as the Great Apes and the Cats are individual *species* given separate attention.

By this procedure it transpires that there are fifty-nine major subdivisions of the nineteen *Orders* of Mammals, and that these in turn may be broken down into one hundred and eighty-six “families” or kinds. The really overwhelming fact that comes out of this analysis, however, is not the mere number of different recognized forms of Mammals but their incredible variety of form, structure, history, size, and behavior. Unfortunately, in a work of this compass, designed to be comprehensive in only one respect—in this case, the *systematic*—there is simply not the space to discuss the last of these aspects of mammalian life—namely behavior.

Actually, we know comparatively very little about the habits of the vast majority of Mammals but even that which is known and recorded would fill not a volume but a large library. The closer, more intimately, and more thoroughly any animal is studied, the more facts about it we discover to be unique. Every species of Mammal is absolutely distinct, and distinctive, in form, habits and behavior. There cannot really be any end to the marvels, mysteries, and just plain facts that wait to be discovered

about Mammals, and as yet we have hardly made a start in this field. The wordage that has been recorded on the rat, the guinea pig, the horse, and sundry other common Mammals is probably beyond compute. And yet at least ninety-nine per cent of all Mammals have to be passed over with the comment that nothing at all is known of their habits or behavior. What is more, the average person probably does not even suspect the very existence of about ninety-five per cent of extant Mammals.

This, then, is the major purpose of this book: to bring together a comprehensive index of the living Mammals, and to describe them adequately enough for anyone, regardless of whether he has specialized knowledge or not, to be able to identify them on sight. In this connection, more than a passing recognition of the illustrations in this book is called for.

Photography, from the day of its discovery and long before its perfection to the point of general usefulness, became more than just a handmaiden to science. For recording reality there can, of course, hardly be a better medium because the camera, even in its most primitive form, sees and records many things that are quite beyond the scope of the human eye. A notable example in the zoological field was the discovery by photography of the true method by which a horse walks, trots, canters, and gallops, matters that had been debated for centuries and which had quite eluded the best of artists.

Almost everybody who has inspected the work of the classical painters, and more particularly that of the professedly realistic schools, must have wondered whether the artists really saw the persons, objects, or scenes in the manner in which they depicted them. Did the little dogs in Holland always prance about on one front and one hind paw, and did trees always then grow like olive-brown cotton-wool in the shape of a cottage

loaf? Similarly, any naturalist with firsthand knowledge of live Mammals who ever looked at the illustrations in the older zoological works must have entertained the gravest doubts as to the reliability of the artist's vision and especially such examples as the grotesquely distorted interpretations of the Audubons. However critically and conscientiously people looked at live animals, it was, before the invention of photography, only the very rare genius who transferred the reality, rather than what he thought he saw, to paper or canvas. In fact, the impressionists of the Old Stone Age far surpassed the best nineteenth-century animal artists in this respect, while the Chinese, Japanese, and certain African tribesmen have been matched only by a few Europeans of the genius of Durer. It was photography that changed all this and not only by giving us its own descriptive record but also by leading the modern artist to depict animals the way they really are.

The final step has come with the development of color photography. Although there is still a very great deal to be learned about the use of this medium and especially for the recording of animal form, nothing surpasses it as a method of describing living things. Here are the Mammals as they actually are, each in a distinctive pose, something that is of very real significance even in the technical classification of animals. For this remarkable achievement the author wishes herewith to pay tribute to the photographers responsible for these works of scientific art.

Just as the field naturalist may see a thousand animals before capturing a single worthwhile specimen, so it is with the photographer of animals; his patience, labor, and fortitude are only surpassed by his percentage of disappointments, for a good animal portrait can never be a snapshot and is hardly ever aided by luck.

Egg-Laying Mammals

1. *Platypus*

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PLATYPUSES are found only in the eastern third of the mainland of Australia and in Tasmania. They are semi-aquatic, spending about two hours a day, morning and evening, paddling about in the mud at the bottoms of rivers, streams, lakes, and ponds, looking for worms, insects, shellfish and other food. They inhabit ice-cold streams at 6,000 feet and tropical swamps at sea level. The rest of the time they either wander about on the banks or dig complicated burrows beneath them. Most burrows are inhabited by a pair but when eggs are on the way the female goes off and digs a special retreat from which her mate is excluded. Into this she retires for a period of three weeks and makes a nest. The little three-quarter-inch eggs are incubated in this for about two weeks, the mother holding them on her curled up body. Nor does she leave the nest (which she barricades with a series of loose earth stoppers at intervals along the main tunnel leading to the outside) until the eggs are hatched and the young have learned to suck from her fur the milk that seeps through

certain special, enlarged pores in her skin. The eyes of the young open only after eleven weeks and the babies remain in the nest for at least another six weeks before weaning begins. This is completed in three weeks and the young then develop the characteristic colossal appetites of their parents.

The most unexpected feature of all, and one which the Platypus shares with the Spiny Anteaters, is sharp, recurved spurs carried by the males on the insides of their ankles. These are perforated by a duct that leads to a long tube running up the inside of the lower leg, then curving around to the front and passing upwards to large glands on the outside of the upper legs. These glands secrete a poison that is deadly to some small animals and can give intense pain to a human being if he is well jabbed by the spur; and occasionally even more unpleasant complications have been known to set in. These are the only truly venomous mammals known, though it is now recognized that the bites of certain shrews are poisonous.

Although the Spiny Anteaters are most competent diggers, they do not tunnel like the Platypus. They live on the surface both in open wooded and grassy areas, but they seem to prefer rocky ground. In order to obtain a sufficient bulk of ants and other insect food they have to lead unexpectedly active lives compared to their lethargic behavior in captivity, where an abundance of food is provided and they spend most of their time sleeping. In their own habitat they are constantly crawling about, snuffling, turning over stones, and probing under things with their snouts. Their strength is prodigious, and even on the slippery floor of a house they can wedge themselves under an average day bed and shift it right across a room. Their principal method of defense is to dig furiously with all four feet and thus sink quickly down into the ground until only an oblong dome of spines is left above the surface. This usually balks any enemy completely.

Spiny Anteaters also lay small leathery eggs, usually two but sometimes three or only one. These are laid directly into a primitive pouch which develops every year at the breeding season. The mother accomplishes this by curling her body into a ring like a caterpillar, with her hind end innermost so

that the egg on emerging from the cloaca slips straight into the pouch. This pouch is lined with coarse hairs, and an extremely sticky substance exudes from the cloaca along with the egg. This dries rapidly in the air and thus gums the eggs to the matted hair. The young hatch out in the pouch and stay there, sucking the milk that exudes from their mother's skin through her fur, until their spines grow long enough to interfere with their movements or irritate the mother. They are then scratched out by her and deposited in a safe hidden spot while she goes out to forage. The young remain in this primitive nest for several weeks before they are weaned.

These animals never have any teeth, but they have a sort of rasping apparatus formed by horny ridges on the roof of the mouth proper and on the upper side of the back of the tongue. These grind up the insect food but use sand and grit in considerable quantities to do so. This material then passes on into the stomach, which is a sort of gizzard like that of birds, and there the mass is further reduced. The food, though predominantly insects, appears to be very varied. They have been seen to rip open dead animals and lick up blood and other fluids.

2. *Five-toed Spiny Anteater*

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Pouched Mammals

3. *Mouse-Opossum*

E. P. WALKER

ALTHOUGH designated pouched mammals, not all Marsupials have pouches. Some, like the kangaroos, have large bags, others have shallow cups, others only flaps of skin, and some have none at all. Certain kinds have them pointing backwards like miniature observation cars. In all cases, however, the young are born so early that they are no more than half-developed embryos. These usually find their own way to the pouch, or at least to the teats, to which they attach themselves and then remain attached for weeks. In some cases there are invariably more young than there are teats, so that the weaker perish outright. Most Marsupials have a tremendous mouth gape and a formidable battery of teeth, but these also have developed in all kinds of ways to meet the diverse needs of the various species that bear them. There are five groups of Marsupials with representatives still living today. The first of these, called the Didelphids because they have two wombs, are found only in the Americas and form a rather tight little group varying in size from the Common Opossum of the U.S. to a tiny, shrewlike animal with a long, pointed nose and a short, mouselike tail that inhabits the leaf mould of the Amazonian forest floor. In all, there are some forty quite distinct kinds of Didelphids that are divided into eleven genera. In South America the so-called banana opossums—*i.e.*, the Four-eyes and the Woolly Opossums—are the best known. They all eat just about everything that can be digested, from live insects and other animals, to leaves, fruits, carrion, and not infrequently each other. They move about at night and have poor daytime vision, and are, from our point of view, incredibly stupid, but they all have amazing powers of survival.

Mouse-Opossums

These beautiful little creatures (Plate 3) are about the size of a large mouse and nearly all of them are some shade of rich russet brown or brick-red above, and yellow or white below. Their naked prehensile tails are pink, as are their hands and feet. Their eyes are very large, jet black, and protrude as if the animal were being squeezed to death. The muzzle is long and



sharply pointed like that of a tiny fox, and the needle-sharp teeth can give a really terrible bite for their size. Besides, they are able, like all opossums, to open their jaws to an angle of almost 180 degrees. Mouse-Opossums are extremely quick little devils and are completely fearless, opening their mouths at anything that threatens. However, they sometimes forget to close them again for half an hour or so. They are primarily insect-eaters, but will take fruit, scavenge, and fish for small animals in water-filled holes in trees. Their fur is almost as silky as that of chinchillas, and they keep it meticulously clean by industrious licking and combing with the claws and front teeth. They are essentially tree-living animals, but one species inhabits caves in Trinidad, and another scrambles about in the long grass of damp savannahs in Brazil. From time to time they turn up in fruit stores in North American cities, having travelled up in hands of ripening bananas. The young are about the size of a small bean. A favorite nesting place of one species is in old, dried-out cacao beans, which are about the size of large pears.

Common Opossums

These animals range from the northern United States to the Argentine, but display a considerable amount of variation in size, shape and color. Those of the north (Plate 4) and colder upland areas are heavy-set, slow-moving, short-tailed, and covered in a thick coat of white underwool and a long grey overcoat. To the south they get blacker and the undercoat sparser, and in the tropics they are long-legged, have very long tails and short fur. Opossums have hands not unlike ours, and their big-toes are constructed like overgrown thumbs. The tail is naked and scaly like that of a rat, and is prehensile so that the animal can hang by it from a branch for almost endless periods. They sometimes give birth to as many as eighteen young at one time, but since there are only thirteen nipples, several usually are abandoned at once, while seldom more than half a dozen survive to reach adolescence.

Woolly Opossums

Much smaller than the common species are some beautifully colored, woolly-furred little opossums (Plate 5) known by the delightful scientific name of *Philander*—a complete misnomer that somehow got transferred to them from the Malay word meaning a certain small deer. They are also tree-living fruit-eaters, though their stomachs often contain insects, snails and other small animals. Their tails are considerably longer than the head and body combined, and are fully prehensile, furred at the base but the rest being naked skin blotched with dark grey and pinkish hues. Their eyes are quite large and bulbous and bright orange; they look like

polished pebbles and the pupil contracts to an invisible pinpoint in bright light. They are a bright brick-red above, and usually orange below, but often have a purplish wash about the shoulders and haunches. Two flaps of skin on either side of the mammary swelling which bears the nipples serve as a crude pouch to hold the young.

* * *

The Dasyurids are a widely assorted collection of animals. Nevertheless, they all had a common ancestry and are truly related. Two rather abstruse technical points may be used to pin them down; all have eight upper and eight lower front teeth, and all have the toes of the hind feet separate. There



5. *Woolly Opossum*

MARKHAM



4. *Common North American Opossum*

LA TOUR







7. Broad-footed *Phascogale*

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are five distinct groups of Dasyurids, but the first four, although different in external appearance, are more closely related anatomically, and constitute a single family. The fifth is most curious. As a whole, the Dasyurids are the carnivores of the marsupial world.

Phascogales

These are mouse-sized, mouse-shaped animals, with tapering tails clothed throughout in short hairs (Plate 7). They have very small big-toes without nails, and the pouches of the females vary from a pair of rudimentary ridges to complete pockets pointing backwards. They seem to inhabit the whole of Australia, Tasmania and some islands to the north. Pads on the soles of the feet and hands have ridges to aid in climbing trees and rocks, and one species has actually been seen running across a cave-roof upside down. They eat mostly insects, make large nests of dry stuff, and kill mice. Some store food in the form of fats in their tails. The muzzle is like that of a shrew, the ears are pointed, and the claws are

long and sharp. The fur is rather soft and sometimes silky.

These little animals are often called "Pocket-mice"; it would undoubtedly seem easier if we called them "Pouched Mice and Rats," but there are true mice and rats with pouches, although in their cheeks instead of on their bellies, already well known by this name in America. Those animals are Rodents, whereas Phascogales are tiny, kangaroo-like Marsupials. There is an almost bewildering variety of them but they can be divided into seven distinct groups of genera. Although all are small—varying in size from that of a small House Mouse to a fairly large rat—they display a great range of characteristics. It is unlikely that anybody except a keen Australian naturalist will ever see any one of them alive, but then who would ever have supposed that a colony of Rufous Elephant-Shrews from Tanganyika would be established in Annapolis, Maryland.

Marsupial Moles

These incredible mole-shaped creatures (Plate 8) have horny muzzles and naked, hard-skinned, stumpy tails, reduced

8. Marsupial Mole

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6. *Cuscus*

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limbs with paddle-shaped feet, and hands bearing immense digging claws. They are clothed in iridescent silky fur varying from almost pure white to bright tangerine in color. They have no eyes and only minute holes for ears. They burrow under sand and loose earth in the desert areas of central Australia, eat insects and are very rare. They look exactly like the Golden Moles of South Africa, but are true Marsupials. Although more specialized for life underground than any other known mammal, these animals appear to treat the soil more like a liquid than a solid. They dive into it and burrow along about three inches below the surface for a certain distance, collecting subterranean food as they go, but they do not make true tunnels. Instead, they swim through the soil, leaving behind what they dig from in front. Every now and then they come up for air, travel a short distance on the surface, and then plunge below again. They eat mostly earthworms, and are furiously active, but are constantly dropping off to sleep for short periods, and indeed so suddenly that they often appear to have "fainted."

The Tasmanian Devil

This gruesome-looking but apparently readily tamed and then docile creature (Plate 9) is now known to exist wild only

in Tasmania, where it is usually referred to as "The Badger." It lives in burrows, does not climb trees very well, and has a neat defensive trick in that it slips below the surface of any available water if pursued and can cover remarkable distances before silently emerging, usually under thick cover. These animals are armed with a splendid set of badger-like teeth for seizing and crushing prey, and they have stout claws for digging. In color they are black with a few large irregular white marks, usually around the throat and forequarters. The young are born in the southern spring—which is our fall—and are usually two in number. The pouch is a semicircular pocket pointing backwards. They make various ugly noises. The Devil is unexpectedly strong for its size, which is about that of a large cat, and is enormously persistent, so that it kills animals much larger than itself and may actually be a menace to young sheep, poultry, and small dogs.

* * *

The largest group of pouched mammals is the Phalangerid and its members are almost as varied in shape, size, and habits as are the Dasyurids. Apart from their name, they are not nearly so bewildering, because after we take out three very

9. Tasmanian Devil

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10. Koala

distinct types—the well-known Koala, the now almost as well-known (from crossword puzzles) Wombat, and the tiny Honey-Sucker—the rest are all long-tailed climbing animals with woolly fur. Three quite separate types of these have developed parachutes stretching between fore and hind limbs like flying-squirrels (see Rodents). They are found all over Tasmania, Australia, New Guinea, and the East Indian Islands, north and west to Amboina, the Celebes, and Timor.

All Phalangerids have the second and third toes joined together up to the base of the claws, and the big-toe is opposed to the other toes—as our thumb is to our fingers—and bears a nail instead of a claw. Almost all have well-developed pouches that point forward and all have five fingers and toes. Only the Koala and the Wombats lack tails.

Cuscuses

The first kind of Phalangerid to be described scientifically happened to be one of the oddest forms, known as the Cuscus, to which the latin name *Phalanger*—or the Fingery-One—was given because of the agile way in which the animal manipulated things with its hands. The name is not inappropriate to all of the Phalangerids with the exception of the Wombats. Unfortunately, the famous Captain Cook not unreasonably applied the name *opossum* to one of the naked-tailed species because of its superficial resemblance to the common Didelphid of North America, and Australians have ever since tended to call them all “possums” collectively, and by native names individually. Further complication has now arisen from the fact that the word *opossum* does not appear to be an American word after all, but itself an import from the Celebes, where the Buginese name for the Cuscus is *O-Possuh*, meaning a little bag or pouch. It is most inconvenient that the Cuscuses happen to be tagged *Phalanger* while the Common Phalangers have the Latin name *Trichosurus*.

These ghostlike night animals (Plate 6) are found all over the Australoid Indies from Timor and the Celebes, throughout the whole of New Guinea to the Solomons, and in the Cape York Peninsula of Queensland in Australia. They have domed skulls, large eyes, close, woolly fur marked in most strange ways, and tails that are part furred and part naked, but covered with a rasplike arrangement of pointed scales. Their color varies so much individually within any one family or local group, and among geographical groups, that scientists have been hard put to it to classify the beasts. It appears, however, that the more or less predominantly spotted species from Australia can be separated from the rest. Even the eye-color varies, one having brilliant red, others orange, yellow, brown, or even blue-green irises. There are isolated populations in various parts of the animals' over-all range where all the members seem to look alike, but even these will



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11. Naked-nosed Wombat

interbreed where their ranges meet those of other populations and new color types then spring up. Their habits are completely Lemurine and nocturnal. They are slow-moving tree-dwellers, with blank stares and retiring habits but vicious tempers.

The Koala

The pert, tubby, tailless little animal (Plate 10) that provided some unknown genius with his model for the first Teddy Bear is unique among marsupials, and is included in the Phalangerids only because it has more in common with them than with any other group. Nonetheless, having a backward-opening pouch, which is an asinine arrangement for a tree-living animal, it is more like some Dasyurids. This poor, harmless little animal has been grossly persecuted for its fur, harassed by dogs, and starved by the clearing of its food trees. It has been almost exterminated in Victoria, reduced to a few colonies in New South Wales, and decimated in Queensland. Koalas feed exclusively on certain eucalyptid leaves, but only for a certain period each year when that tree is producing specific oils in its leaves. When the type of oil changes, the poor little animals have to go down to the ground and take off in search of other species of trees producing an oil that suits them. One or two young are born at a time, and are only about three-quarters of an inch long. They remain in the pouch for six months and until about six inches long. After this they ride on their mother's back for a year, though still using the pouch as a retreat for three months. When they are really naughty the mother turns them over her knee and spansks them on their bottoms for minutes on end with the flat of her hand, during which time their screams are soul-rending.

Wombats

The Wombats have developed both internal and external characters rather like some large rodents. They have only two upper and two lower front teeth, and these grow continually like those of porcupines; the other teeth are rootless and also grow all the time, being worn down on top and continuously replaced from below. They are great diggers, some of the holes they make being over a hundred feet long and usually ending in a capacious nest lined with leaves and bark. Their principal diet is grasses, with some roots, shoots, and fungi. In appearance they are rather like bears, with thick close fur, short sturdy limbs and no tails, and they are the size of a very large heavy-set dog with stout legs. They have nail-shaped claws for digging. There are two principal kinds of wombats, one known as the Naked-nosed (Plate 11) and the other as the Hairy-nosed. Both are becoming very rare and are now confined to limited localities. The former originally dwelt in the hills and mountains, while the latter were found in the coastal plains and all over the inland plateaux and lowlands.

Brush-tailed Phalangers

These lovely little animals are the true, common, "possums" of Australia. They are normally said to have foxy faces



12. *Brush-tailed Phalanger*

AUSTRALIAN INFORMATION BUREAU

but their whole head and their expressions are actually much more like some of the smaller kangaroos. The body is sturdy and compact and looks very plump. The limbs are short, the hands are well clawed but very human in use, while the hind feet have the usual phalangerid thumblike big-toe, and the bound-together second and third toes. Their tails are long and bushy, but have a naked strip under the tip for holding on to

13. *Great Red Kangaroo*

AUSTRALIAN INFORMATION BUREAU



branches. Brush-tails are found all over the continent and Tasmania, and although varying enormously in color from a beautiful chinchilla-grey with black tail, to silver, rich coppery red or almost black, they can be clearly divided into two species-groups—namely the long-eared (Plate 12) from all over the mainland and Tasmania, and the short-eared from the hilly and mountainous areas, stretching from Queensland to New South Wales on the eastern side of the continent.

14. *Tree-Kangaroo*

AUSTRALIAN INFORMATION BUREAU



They are common animals and one of the few marsupials that seem to be able to cope with the advent of the white man and his pests and machines. Millions have been slaughtered for their close, firm fur, but at last some measures of protection are being provided for them. They are inoffensive, predominantly leaf-, fruit-, and nut-eaters, and they are night-walking tree dwellers, though some inhabit miserable dry scrub.

Tree-Kangaroos

This name may at first sound a little mad, since one would no more expect to see a kangaroo than an antelope in a tree. Nonetheless, these anachronisms (Plate 14) are quite common in the forested mountain fastnesses of the great island of New Guinea, on certain other islands, and parts of northern Queensland. There is some doubt as to whether they should be included among the kangaroos at all, or be given a separate grouping of their own, since, quite apart from climbing trees, they have so many features that are unique. However, anatomists are satisfied that all such characteristics as their large, heavy-clawed hands, short legs, broad feet, small fixed ears, and long, tufted tails, are only special developments that have come about to aid the animals in climbing trees. There are over half a dozen different kinds, of colors varying from almost black to pale fawn or greyish and sometimes of complex and beautiful patterns, dark above and light below, and with contrasting face, hands, and feet. They spend much time on the ground but sleep in trees, sitting up with their heads bent between their legs, and they feed on all manner of fruits, leaves, ferns, and even grubs. They get about trees very well but are by no means perfectly adapted to do so; they descend trunks backwards and are rather awkward among small limbs. However, they make prodigious leaps, especially from tree to ground, with the tail stretched stiffly behind as a rudder. Leaps downward of as much as sixty feet have been measured.

True Wallabies

Also called Brush-Wallabies, these are the medium-sized animals that stand between all those that have been described above and the large animals more popularly known as kangaroos. To the average person they are just small kangaroos. They are, however, lighter in general build than the two remaining groups, with very long, round tails that taper gradually and are furred throughout. The forepaws are handlike, but are armed with strong claws, and in most species they are black or at least darker than the forearms. Wallabies have large, deerlike ears which can be turned about and their feet are very long and narrow, usually white or at least lighter than the legs and bear stout black hooflike claws. They come in all manner of colors and color combinations (Plate 15)—pale grey; grey and white; grey, brown and white; sandy; brindled with reddish shoulders; dark chocolate brown; and so forth. Their habits are not as varied, all being grass- and herb- eaters, and almost all of them staying in the taller

brush and especially in those areas where the trees stand somewhat apart from each other. The species depicted in Color Plate 16 (*W. elegans*) has a delightful and descriptive popular name—Pretty-faced Wallaby.

True Kangaroos

There are two principal groups of species of true kangaroos, plus one or two island races and a variable number of other types that may be regarded as distinct, depending on the way you define a species. First, there is the Forester or Great Grey Kangaroo, and secondly the Great Red Kangaroo (Plate 13), which is the largest marsupial we know of, standing seven feet on the tripod formed by its toes and its mighty muscled tail. The former may be clearly divided into eastern and western forms and is, as its name indicates,

predominantly grey, although washed with rufous in the western form. The male of the Great Red is a most curious rich reddish color with a mauve sheen on the back, a grey face and white throat, chest, underparts and feet, and with the insides of the legs and arms and the underside of the tail also white. The female, known colloquially as the "Blue Flyer," is normally a beautiful smoky grey above and white below, but reddish-tinged adults have been recorded. These animals are the Australian equivalents of the deer and antelopes of other

15. *Red-necked Wallaby*

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16. *Pretty-faced Wallaby*

AUSTRALIAN INFORMATION BUREAU

continents, being grass-grazers and brush-browsers. They travel about in "mobs" under the watchful eye of an old male or "boomer" who maintains strict discipline and defends his position against younger male rivals in no uncertain way. He does so by biting and boxing while reserving the terrible slashing down-cut of his tremendous back claws for the coup de grace. The Great Red is found all over the interior of the continent; the Great Grey on the east and west sides and in Tasmania. The appearance of these kangaroos is well known to the people of all countries where there are zoos, books on animals, movies or television, but their true habits are known to few even in Australia where they are still fairly common. Space does not permit me to elaborate on this, but any who are interested should read a little book entitled *Kangaroo* by Henry G. Lamond.

Although large active animals of rather complicated habits, they are not really very intelligent—at least, by our standards. They are easily panicked and then, if not able to escape by headlong flight, usually make all the wrong moves, rushing into fences, running in circles, or stopping to look at their pursuers. They are placid grazers and will seldom stand and fight.

Insect-Eating Mammals

THE strange assortment of curious little animals that make up this order of mammals are all basically related but less closely so than the members of any of the other nineteen orders of living mammals. They form a sort of zoological catch-all into which a number of very ancient forms—some very primitive in structure, others exceedingly specialized—have been tossed.

Perhaps the most unexpected thing about the Insectivores is the enormous number of individual animals in this order. Not only are they found all over the world (except in the greater part of South America, the whole of Australia, the polar regions, and some of the driest deserts) but many species occur in untold millions over truly vast areas. Yet it is probably an understatement to say that not one person in a thousand has ever heard of a shrew, not one in five thousand has ever seen one, and not one in ten thousand actually knows what the animal is. Nonetheless, these fragile little creatures are everywhere, even in city parks, suburban yards, farm fields, and woodlands.

Hedgehog-Tenrec

These look for all the world like small hedgehogs (Plate 17), being covered with small sharp spines, and being able, to a certain extent, to roll themselves into a ball for defensive purposes. They have little stumpy tails and very sharp snouts with which they grub about for insects in drier places during the night. They also dig burrows and go into partial hibernation. There are eight quite distinct kinds of Tenrecs varying widely in appearance and habits but all living only on the island of Madagascar. They are leftovers from very ancient geologic times and are so close to the basic mammalian stock that they even show anatomical characteristics otherwise found only among the marsupials.

European Hedgehog

There are five distinct genera of hedgehogs, or as they were once called, "hedgidogs," individual species of which are spread over an enormous area comprising all of Europe south of the boreal pine forests, almost the whole of Africa except for the really wet areas of equatorial forest, and the whole of Asia with the exception of southern China, Burma, the Indo-Chinese peninsula, Malaya and the Indonesian islands. Their range northward in Asia is limited by the extent of the deciduous woodlands. As a whole, hedgehogs are very much of a oneness, but the best known and one of the most

widely spread of those found in Europe (Plate 18) happens to be one of the most extreme forms. They are small animals with tiny naked stumps for tails, heavy, bloated bodies, small, pointed heads, short limbs with small feet armed with short fingers and toes but slender sharp claws. The head, throat, and undersides, including the limbs, are clothed in fur which may be sparse and coarse or abundant and fluffy; the rest of the body, is covered in an interlocking mass of short, hard spines with exceedingly sharp points. Each of these is longitudinally grooved and in some kinds the ridges intervening between the grooves are serrated like the teeth of a blunt saw. Although some dig, they do not make burrows but live in the cover of tangled undergrowth where they rummage about for their most varied diet of insects, eggs, small animals of all kinds, fruit, fungi, roots, and other vegetable items.

Elephant-Shrews

Throughout the continent of Africa from Algiers to the Cape, but predominantly in dry areas, and excluding large areas in the west and in the central wet equatorial zone, there exist countless numbers of remarkable little animals having the appearance of miniature kangaroos but with sleek fur and small trunks. These have become known as Elephant-Shrews (Plate 20). They range in size from that of a large mouse to a large rat and come in a large variety of colors and color combinations. Zoologists have divided up the group into five genera, depending on such details as the number of fingers and toes, and the number and form of the teeth, but, with the exception of a large, rather short-legged type from East Africa known as the Rock-jumper, there are no popular English names to use in differentiating them, but they vary greatly in external appearance.

* * *

The Soricids, like the rest of the Insectivores, are an ancient stock but unlike the others they have become enormously widespread and numerous. They are found in all moist areas south of the subarctic frost line throughout Eurasia and North America, and in Africa; one species of shrew spreads through Central America to northern South America. The moles are not found in Africa or Southeast Asia. They are all primarily insect-eaters but shrews will tackle almost anything alive and can subsist on carrion and some vegetable matter. Shrews live under things on the surface of the ground, moles burrow below

the surface. Both exist in countless millions and although they are seldom seen and little understood they are almost everywhere.

There are literally dozens of different species of shrews arranged by specialists in over twenty types or genera. With a few exceptions they are all very much alike, but they can be divided into three major lots, two of considerable compass, the third reserved for a single incredible little animal found only in parts of Central Africa. The only simple distinction between the first two groups is the color of their teeth, one being reddish-orange-tipped, those of the other the normal white. The first species to be described is red-toothed (*Soricinae*), the other one white-toothed (*Crocidurinae*).

Short-tailed Shrew

The majority of red-toothed shrews are little different in appearance or habits from the white-toothed but they are predominantly North American, with one genus in eastern Asia. On the whole they have much shorter tails, are a little more chubby and tend to stand up higher on their limbs (Plate 22). Their muzzles are not quite so long and pointed. Apart from a very rare type from the southwestern part of the United States, known as *Notiosorex*, which has large ears and a white stripe down the hind back, this group tends to have very small ears concealed in the thick fur. Like the common shrews they live under trash and matted vegetation or dead leaves, and in the tunnels and burrows of mice and other small creatures. They make small nests in which to digest, rest or give birth to their young, and they eat insects and any other small animal food they come across. They also give off powerful musky odors, and make shrill partially supersonic squeaky or keening noises, and shriek when enraged, which is very often.



17. *Hedgehog-Tenrec*

LA TOUR



18. *European Hedgehog*

MARKHAM

Common Shrews

Plate 23 shows a common American species known as the Long-tailed Shrew, (*S. dispar*).

Common North American Mole

Moles (Plate 19) in the technical sense, which is to say the animals included in the family named *Talpidae*, are much

19. *Common North American Mole*

MOHR FROM NATIONAL AUDUBON



more varied in appearance than the shrews. They may be clearly divided into five groups. There is something unexpected about a mammal living underground; and the appearance of the animal and its extraordinary strength have given rise to all sorts of weird beliefs about its habits and potentialities. Moles naturally prefer areas where the soil is loose and by long association with man they tend to infest his gardens and farmlands. There they burrow along about two inches below the surface in search of food. This consists mostly of earthworms but they will eat any small animals, including mice, shrews or even their own kind. The latter happens when they bumble into another mole's run and one is defeated in the battle that inevitably takes place. They also maintain large dwelling-burrows placed at a lower level and usually under the roots of a tree. This is lined with leaves, moss and other soft material and has an escape exit.

Moles go out to eat morning, noon, and night, literally, for when they are full they fall asleep but invariably wake up in about six hours and unless they start eating at once soon collapse of starvation. They put away about twice their own weight per day. Their bodies are bun-shaped, the head pointed, the eyes minute and either covered by skin or buried in the fur, and there are no visible ears though they have very acute hearing, especially for earth-borne sounds. The tail is short and naked but carries a few sensitive bristles. The hind legs are very short but the feet fairly normal and made for shoving the animal forward; the front feet stick out sidewise, are very short but sturdy, and end in huge handlike paddles with their palms pointing backwards. The nails are tremendous and there is a "sixth finger" made of an extension of one of the wrist bones. When digging, the spade-hands are shoved forward in front of the nose alternately and the earth is then

scooped backwards past the head and under the body. The hind feet then take over and shoot it on backwards into the tunnel. Every now and then the animal makes a vent and erupts the excess out onto the surface, thus making a mole-hill. Some species, however, manage to get along without these periodical eruptions and all moles hard-pack the walls of their tunnels.

The fur of moles is very soft and silky and it grows straight up so that its lay will not hinder the animals in going either backwards or forwards. Moles, like many Shrews and other Insectivores, swim very well and, in fact, delight in entering water either in search of food or when moving from one locality to another. At this time, those moles whose eyes are not covered by skin make good use of what sight they have. The speed with which moles can get about even on the surface of the earth is almost unbelievable, but underground they can move faster than a man normally walks above! The love life of the common mole is remarkable. Normally, he lives alone but at the appropriate season he either burrows into the tunnel system of a female or one breaks into his. Whereupon he promptly takes her captive and if any other male appears he seals her up in a side hole, then quickly hollows out an arena and goes to work on the interloper. He fights until death and the winner takes the female. Meantime, she is busily engaged trying to dig her way to freedom. In time the pair settle down together and work alongside each other in the endless pursuit of food. When the young are due, the female hollows out a nest at a crossroads in the tunnel system where there are plenty of escape routes, and lines the hole with soft material. Three to seven young are born at a time; their eyes are closed and their ears are covered with skin and they are naked. Moles make rather solicitous parents and take a long time to wean the babies. There is always a great dearth of females!

The Star-nosed Mole

Every now and then one comes across an animal that is truly unique. It is as if Nature has an inexhaustible fund of wonders and almost nothing is impossible to her. The backbone of the *Scutisorex* is a genuine shocker to an anatomist, but the front end of a Star-nosed Mole (Plate 21) surprises even naturalists and amazes the uninitiated. Here is an animal looking like a rough-furred mole, with a comparatively long tail and rather long slender back feet, that has enormous paddle-shaped hands with short fingers and stout nails, and a typical pointed head with tiny eyes, but then carries a structure on its snout that is quite out of this world. From this snout grow twenty-two bright pink fleshy fingers arranged radially like the petals of a small flower. They are mobile and very sensitive and can be partially collapsed or retracted and appear to be some form of tentacles to help the animal find its way about. The animal lives in damp soils near water and is semi-aquatic, diving for food, and using its hands like flippers. Star-nosed Moles are found only in the eastern half of temperate North America.



20. *Elephant Shrews*

E. P. WALKER

21. *Star-nosed Mole*

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22. *Lesser
Short-tailed Shrew*

E. P. WALKER



23. *Long-tailed Shrew*

MASLOWSKI & GOODPASTER FROM NATIONAL AUDUBON

Flying Mammals

BATS can be very clearly divided into two great groups normally called, both in popular and scientific parlance, the Greater, and the Lesser Bats, but which we refer to as the Fruit-eating and the Insect-eating. Both pairs of names are somewhat misleading since the Great contains many species that are much smaller than many of the Lesser, while there are Lesser bats that eat fish, fruit, or, in two cases, nothing but fresh blood. There is even evidence that some Great Bats eat a certain amount of insect food. Nonetheless, the distinction is real, for there are structural differences between the two, notably in the construction of the shoulders which, in the case of the Fruit-Bats, is more like ours and aids steady long-distance flight. Fruit-Bats are found only in the tropical and subtropical parts of the Old World, including Africa, India, the Oriental Region, Australia, and the Pacific archipelagos. Insect-eaters are distributed throughout the world between the Arctic and Antarctic circles, even on New Zealand and many isolated oceanic islands.

Fox-Bats

This is by far the largest group of Fruit-Bats and contains the largest known individuals, creatures with a wing span that has been known to exceed five feet and bodies as big as ravens. A large number of these are also known as Flying Foxes (Plate 24). They are distributed all over the Western Pacific, Australia, Indonesia, the Oriental Region and north almost to Japan, throughout India, and west around the Indian Ocean to the little island of Pemba off the coast of East Africa just north of Zanzibar, the Comoro Islands and Madagascar. For some strange reason they have not established themselves on the mainland of Africa only a hundred miles hard by, where their place is taken by another family of Great or Fruit-Bats. They come in all sorts of colors and color combinations, usually with a ruff of a complementary shade around the neck that forms a sort of cape over the shoulders. Apart from size, they all look much alike, having (as can be seen in the color photograph) a heart-shaped body, large clammy-looking wings, and a face not unlike a fox, with bright brown eyes, small pricked ears, and a simple muzzle.

Most of them live in colonies and are commuters, flying forth at sundown to feeding grounds that may be twenty miles away and even on islands across the sea. They travel in long lines or streamers and fly slowly and purposefully with measured strokes and are one of the most impressive sights in the clear evening skies of an Oriental sunset, passing by overhead in their countless millions regardless of man's works below.



24. *Flying Fox*

MARKHAM



25. *Vampire-Bat*

MOHR FROM NATIONAL AUDUBON



26. *American Fruit-Bat*

MOHR FROM NATIONAL AUDUBON

27. *Serotine Bat*

E. P. WALKER



Vampire Bats

The true Vampire Bats (Plate 25) are unique in habits, being the only mammalian true parasites in that they can feed only on the blood of other animals, ranging from man to toads, which they take from live victims. They are gruesome-looking little bats with almost spherical bodies, pointed ears and a naked nose rather like that of a bulldog. They fly well, but also scuttle about on all fours like great spiders, holding their wings tightly folded back along the forearm and having large, padded thumbs.

These bats have always fed on human beings and horses as well as other animals and as they can carry rabies, Murrina, Chagas Disease, and other fatal afflictions for long periods in their bodies, they have had a very serious effect in South and Central America. There is a belief among the Amerindians that they were responsible for the extinction of the original American horses. In the last quarter of a century they have decimated the cattle herds of South America.

American Fruit-Bat

This family comprises no less than thirty-five genera split into some two hundred species. It is primarily tropical and confined to the New World. One genus (*Macrotus*) is found in the southeastern part of the United States. They are all distinguished by a pointed leaf- or spear-shaped structure that arises from the nose.

One large group of eight genera is well exemplified by the large *Artibeus* known as the American Fruit-Bat (Plate 26) which lives in small isolated communities and sallies forth before dark to its feeding grounds. They have comparatively large eyes and often sleep in places where direct sunlight may penetrate.

Serotine, Cinereous, (Plate 29,) and Red Bats (Plate 30)

We now come to what is by far the largest group of bats, one that has no less than twenty-five genera but an even larger number of species than has the Leaf-nosed Bats. Moreover, most of them are distressingly alike so that their identification is a pastime for experts only. They are insect-eaters and are found throughout the tropical and temperate regions of the world. They do not have nose-leaves, and the nostrils are simple. The ears always contain a false-ear or tragus.

Free-tailed Bat

The least batlike of bats, though in point of structure perhaps the most advanced, specialized, and thus profoundly of the bat class, are the Molossids. They are dog-faced, naked-tailed, short-furred, folded-eared, bright-eyed little creatures (see Plate 28, the Free-tailed Bat, *Tadarida*). Of these there are six genera spread over all the warmer areas of the world. They have large tails that protrude from the back edge of the inter-leg membrane but that are loose within the skin and can be pulled in or pushed out. Their ears are indescribable.

28. *Free tailed Bat*

MOHR FROM NATIONAL AUDUBON



29. *Cinereous Bat*

E. P. WALKER

30. *Red Bat*

PINNEY





31. *Tarsier*

LA TOUR

Top Mammals

THIS great order of mammals to which we ourselves belong was in past times placed at the top of the whole scheme of life, and still retains a name appropriate to that exalted estate. However, all researches conducted along many different lines in anatomy, palaeontology, and even histology and psychology, have now combined to alter this status. The Primates, in fact, are the end-product of an ancient offshoot of the mammalian tree that branched off way down the trunk almost at ground level, and all of them retain what is called a considerably primitive or basic makeup.

The Primates are an enormous group, and exceedingly varied. Their living representatives display all the states from the wholly bestial, clawed tree-climber using its forefeet solely for locomotion, and its mouth for catching food, to busy and ingenious twentieth-century man who can live in a wider variety of environments than any other living thing because of the versatility of his body and the activity of his hands.

Tree-Shrews

The first division of the Primates consists of small squirrel-shaped animals found in the Oriental Region; these in no way resemble the rest of the order externally. Even specialists can hardly bring themselves to believe that they are Primates, and many still prefer to place them with the Insectivores. Their position in the scheme of life is somewhere between these two orders, which most clearly demonstrates the fact that the Primates sprang directly from insectivore-type animals. Most of them are so like squirrels in behavior and color that it is impossible to tell them apart in the trees where they constantly associate. They have long, shrewlike snouts with lots of whiskers, four upper and six lower front teeth, five fingers and toes all with sharp claws, and long bushy tails, of which the fur on the underside is short and harsh. Like shrews they are irascible and fight and scream among each other, but in all other respects they are much closer to the Lemurs. For instance, the eye is surrounded by a complete bony ring, some have a tiny appendix, and all have a rudimentary second, cartilaginous tongue underneath the ordinary fleshy one.



32. *Tree-Shrew*

PINNEY

33. *Moholi Bushbaby*

MARKHAM





34. *Black Lemur (female)*

LA TOUR

Tarsier

In the equatorial forests of Sumatra, Java, Borneo, Celebes, and the Philippines, and in a number of associated smaller islands, painstaking search in holes in the trunks of trees or among matted conglomerations of vines, dead leaves, and parasitic plants may sometimes bring to light pairs of incredible, somewhat hysterical little animals about the size of rats (Plate 31). These combine as odd an assortment of strange features as can be found in the world of mammals. These obscure little beasts have in recent years become comparatively well known through the medium of picture magazines, popular films, and even toy representations. They are known as Tarsiers (*Tarsius spectrum*, etc.) and their intrinsic interest is twofold.

First, their general appearance is not only spectral but quite out of this world: secondly, they are of exceptional scientific interest, since they stand alone as the sole survivors of a most ancient lineage. Away back, some sixty million years ago, their ancestors must have been something like the Tupaioids, but they seem to have become distinct even at that early date, and although they diversified somewhat later, all of their kin died away and left them alone to survive until the present. In basic anatomical structure they are unlike any other Primate, but in most superficial features they most resemble some Lorisoidea and Lemuroidea.

The Slow Loris

The name "loris" comes from the Hollandsche "loeris," meaning a clown, and was originally given to the Slow Loris (*Nycticebus coucang*) of Indonesia because of its tragicomic countenance. The name, as will be seen from color plate 36, is fully justified.

This, the largest species, measuring up to sixteen inches, is almost tailless. It is found in ten distinguishable forms from the Bramaputra River in Assam east to Tongking and thence south to Singapore and beyond to the islands of Sumatra, Java, and Borneo. It is very corpulent, and has short, sturdy limbs and a rather small head with soulful-looking eyes placed close together. In color it is brownish cream with a silver wash, and it has russet-colored facial markings and a median dorsal stripe. Its thumbs and great toes are so widely opposed that they point almost directly away from the four fingers and other toes. The index finger is small, the thumb enormous. All the digits bear small nails except that next to the big toe, the second, which, as in all Lorisidae, bears a large, recurved claw. It is nocturnal and eats a wide variety of animal and vegetable food, but notably certain large insects which it catches with its hands while holding on with its feet, sometimes suspended from a branch.

Pottos

Found throughout the forested areas of West, Central, and East Africa. They are a little longer but slimmer than the

Slow Loris, have furred tails about a quarter of the length of the head and body, and are gingery or yellowish-brown in color, sometimes with a grey or silvery overwash (Plate 39). Their eyes are fairly large and the hands and feet go one stage further in that both the second fingers and toes are reduced to mere stumps. They are known in West Africa as "Softly-Softlies," which aptly describes their deliberate movements, but they really hustle along when alarmed, and can make very swift passes with their hands in taking food. The bony points on the top of the vertebrae of their necks protrude through holes in their neck skin and are very sharp. The animal uses them as a defense by suddenly flipping the head down and then butting with the back of the neck. They eat fruits and insects and also catch sleeping birds by creeping up on them.

Moholi Bushbaby

These are altogether different animals, having long, bushy tails, very large ears that can be voluntarily wrinkled individually and turned about in the most extraordinary manner. They have very sharp faces and large, staring eyes; the pupils are contractile to the point of invisibility. Their thumbs and big toes are large and opposed, but not so much so as in the lorises, and the fingers and other toes are long, fairly slender, and provided with huge, fleshy, terminal clinging pads. The fur is woolly, soft and very thick.

There are three great groups of Bushbabies, one greyish washed with brown in general tint, with reddish limbs and a not very fluffy tail that is almost black, and with very slender fingers and toes. It is found only in the Cameroon and Gabon in west central Africa. The second, which is composed of the largest species, occurs all down the forested parts of the East African coast from Kenya to Natal and over another large but isolated area from Lake Tanganyika through the southern Congo to the Angola coast. The third group, typified by the little Moholi Galago (Plate 33), which has become quite well known as a pet, is spread in a variety of forms all over the savannah country between the forests inhabited by the other two, from Senegal in the west to Kenya in the east and south down to the Limpopo River. The last two species vary much in size and color from place to place, but all are for the most part nocturnal and eat much more vegetable matter than the lorises.

Black Lemur

The Black Lemur (*L. macaco*) is entirely arboreal though it will drop to the ground when pursued. The female (Plate 34) instead of being all black is reddish brown with paler ruff and rump. This is one of the true Lemurs, some score of different animals, all related and all found only in the great island of Madagascar and its natural dependencies, the Comoro Islands. These differ enormously in shape, size, and habits. The smallest is slightly larger than a mouse, the largest as bulky as a big dog and about four feet in overall length. The smaller and more primitive are very like the Bushbabies of Africa:





36. *Slow Loris*

MARKHAM

← 35. *Golden Lion-Marmoset*

PINNEY

the larger are monkeylike and not unintelligent by our standards. All except one (the Indri) have long bushy tails, and all have pointed faces with the nostrils at the tip of the snout. Their lower front teeth are directed forwards and form a comb, the outer pair being the eyeteeth, and the lower tusk really a cheek tooth with two roots.

Maned Marmosets

There is another group of Primates somewhat more closely related to the monkeys, but still not sufficiently close to be classed with them. This is a South American group composed of several scores of very small animals with squirrel-shaped bodies, but faces resembling tiny monkeys. They come in a great range of colors and include some of the most exotically clothed of all Mammals. Anatomically they are more like the Ceboids, or South American Monkeys, but they are highly specialized, have lost the four hindermost pairs of teeth, and have retained a number of primitive features, notably claws on all fingers and toes except the big toe. Far away to the southeast in two river systems, the Ribeiro and the Parahyba, that debouch into the Atlantic on the Brazilian coast, live two

of the most colorful of all Mammals and the most exotic of Marmosets. They are known as the Golden Lion-Marmosets. They have manes and the peltage is long and silky. In one species (Plate 35) it is brilliant, metallic gold all over; in the other the face, body, and arms are black, and the tail, except for a yellow crest, is dark grey. They have exceptionally long, slender hands and feet, and the limbs are very long. The tusks are huge.

Plumed Marmosets

In the same area, but spreading over a much more extensive territory—namely, the tall, moist tropical and sub-tropical forests, known to Brazilians as the *Tupi*, which stretch along the southeast coast of their country and which are isolated from the Amazon forests by the dry uplands known as the *Caatinga*—are found a whole aggregation of small marmosets that are most distinctive. They have small, compact bodies and comparatively short back legs so that they run and hop rather than leap about the trees. Their faces are small and usually bear a triangular light blaze on the forehead. Their ears are large but partly concealed by the head



37. *White-plumed Marmoset*

MARKHAM

38. *Black-plumed Marmoset*

PINNEY





MARKHAM

39. *Potto*

fur and partly by a drooping tuft or whisk of long plumelike hairs that sprout from the back of their cheeks. There are about half a dozen species, all clothed in very soft fur that is black at the base, then orange, and then tipped with black and white. Their tails are ringed, the feet small, the teeth moderate. The two best known (*C. aurita* and *penicillata*) (Plates 37, 38) have pure white and pure black plumes respectively.

Black-capped Capuchin

These are "monkeys" *par excellence*, including, as they do, the typical companion of the street organ grinder of old, the

commonest monkeys of almost all zoos, and the principal forms offered for sale in all American pet-stores. However, there is the most appalling confusion and an almost universal misconception about their habits, affinities, and nomenclature. They are average-sized monkeys, the head and body measuring about fourteen inches to two feet when adult, but they come in a large number of forms that are distributed from Guatemala in Central America to the southern limits of the Amazonian forests in South America. Their tails are fully furred throughout, and are partially prehensile—that is to say, the animals use them as a steadying organ and can hang



40. *Black-capped Capuchin*

PINNEY

41. *Golden Spider-Monkey*

LA TOUR



42. *Squirrel Monkey*

LA TOUR



by them for a limited period, but they cannot be used as a fifth hand like the tails of the monkeys reviewed below. Dozens of species have been described, but these may be reduced to some dozen or so major assemblages which in turn fall into three fairly clear categories.

The second aggregation are found in the Orinoco basin and the Guianas north of the Amazon, and in Trinidad. They are much more heavily built, are clothed in thick brown coats, darker on the back, limbs, and tails, and they display a wide range of variation in body and facial markings. They are distinguished by having heavy fur around the ears when fully adult; this gives the face a rectangular appearance from the front, and in southern forms it may be developed into tall crests arising on either side of the head above the ears. The typical form is *Cebus nigrivittatus* of the Guianas (Plate 40)—apparently the original organ-grinder monkey.

Golden Spider-Monkey

Here again we are confronted with a bewildering assortment of closely interrelated animals varying in color and color pattern this way and that; further, they display all kinds of individual variations within the tribe in some areas, but in others all are just as strikingly alike (Plate 41). In some respects there seems to be no rhyme or reason attached to these gradations in color. They are found from southern Mexico to Uruguay in all forested areas. In build, they are indeed spidery, having immense limbs and long prehensile tails with finger pads. The head is small, the face naked and the hair of the crown is directed forwards. The hands are either entirely or practically thumbless and all the fingers form a combined hook. All kinds, however, are alike in habits, being denizens of the tall forest and never, if possible, coming to the ground. They move about in large troupes feeding on leaves, fruit and green nuts, and when in a hurry they are almost as agile as Gibbons.

Squirrel Monkey

In the gallery-forests that line the great waterways of the Orinoco, Guianese, Amazon, and associated watersheds, the commonest primates are small, long-legged monkeys with very long club-shaped tails (Plate 42). They go about in large troupes, sometimes numbering hundreds. They are called in pidgin-English "Monkey-monkey Monkeys." Nevertheless, they are most unmonkey-like in many respects, having elongated ankle bones like some lemurs, and strangely formed skulls that bulge out behind the neck almost as far as the face does in front. The face is small and white, with a black muzzle and dark rings round the eyes. The ears are large and furred, and often adorned with tufts or plumes. The fur is close and straight, though woolly to the touch, and is a mixture of brown, gold, and bright green, blending to vivid yellow-orange on the flanks, forearms, legs, hands and feet. In some, the head and shoulders are black, and the tail is slightly clubbed.

43. *Vervet Monkey*

PINNEY





44. *Diana Monkey*

LA TOUR

45. *Colombian Douroucoulis*

PINNEY



Douroucoulis

There are four and perhaps five clear-cut kinds of monkey-like animals in South America that have thickened, and in at least two cases, clawlike nails on both fingers and toes. They have very close, thick fur—in one case with a coarse overcoat—and bushy tails that may be clubbed, may taper like those of dogs, or be cylindrical like that of a cat. Their fingers are long, slender, and very human in form and arrangement, the thumbs and big toes being widely opposed.

More than a dozen different species of Night or Owl Monkeys have been described, but it appears that there are only two basic stocks, one found on the north and west side of the Andes in Colombia, and the other on the south or Amazonian side. Both have bodies about a foot long, covered with close, rather woolly fur, neatly rounded heads and very flat, naked faces. The eyes are enormous, circular, very close together, and owl-like, having highly contractile irises of a bright golden color. The muzzle, mouth and chin form a round dome, and the ears are small and fully furred, and almost concealed in the fur. The tails are very long and thickly furred, but neither bushy nor clubbed, and the hairs on the underside at the base are stiff and form a sharp keel. All of them have vivid white "false-eyes" above the real eyes, and these may extend upwards to form white stripes which may meet on top of the head; otherwise the whole front and top of the head is black. The northern group is more monkey-formed, with large heads, and short fur; these (Plate 45) are greenish golden-brown above and bright orange below and have black tails.

Vervet Monkey

The true monkeys are confined to the Old World. They are divided into three groups one of which is exclusively African, and which are known as guenons.

All these monkeys are strikingly similar from an anatomical point of view but they may be separated into groupings on the basis of their over-all color arrangement and other ornamentations. There are about a dozen of these groupings, the commonest and best known of which consists of the so-called Green Monkeys (Plate 43), otherwise called Vervets or Grivets. They live all across Africa from Senegal on the Atlantic to Abyssinia in the east, and thence south to the borders of the Union and to the southern limits of the forests. They are exceedingly neat, tidy animals that live in large troupes on the open savannahs and are very quick, intelligent and quite fearless, attacking and driving off even the larger baboons.





→
47. *Silvery Gibbon*

PINNEY

46. *Mandrill*

LA TOUR

Diana Monkey

Quite different and most distinct are the beautiful Diana Monkeys of the West Coast of Africa (Plate 44), black above, pure white below, with pointed white beards and bright red markings on the flanks and hind limbs, and sometimes a lemon-yellow edging to the white chest.

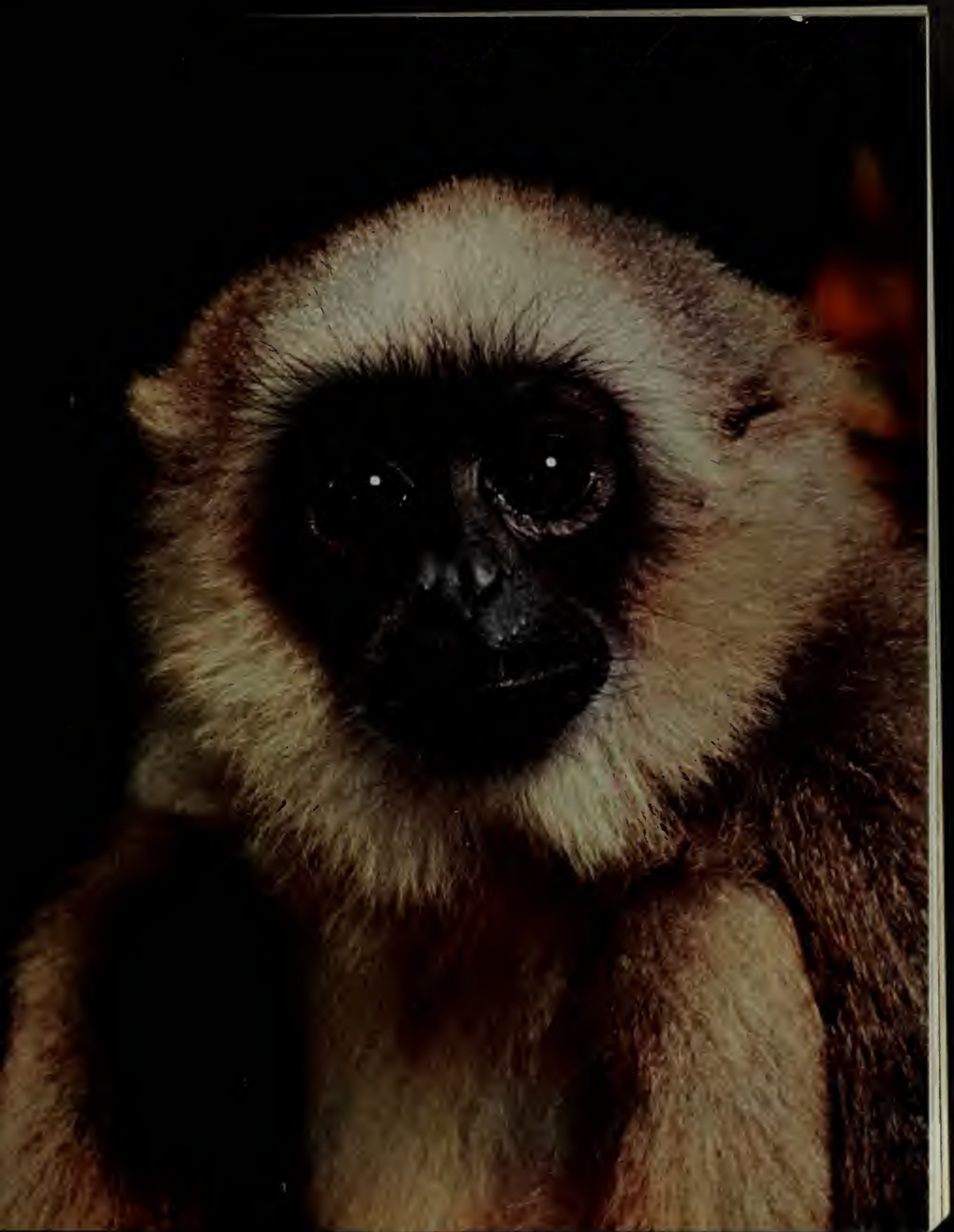
Mandrill

In the wet forests, where baboons are not found, two species of virtually tailless monkeys of monstrous appearance take their place. One, the Drill, is dark olive green all over with a shiny black face and pale pink buttock pads. It roams about in large bands on the forest floor, eating anything edible, and although it avoids humans, it can be extremely dangerous if molested. The Mandrill (Plate 46), which is found

only in the Gaboon, is a grotesque animal. It roams about the deep forests in large gangs, but also makes forays out on to the open savannahs and among rocks in the mountains.

Baboons

There are half a dozen recognized forms of true baboons, all except one found in Africa. They are the bulkiest of all monkeys, and are essentially ground-living animals though they can climb trees and rocks with great agility. They all have well-developed tails, but of varying length, none being as long as the head and body. The most exaggerated form is known as the Hamadryas which was the Sacred Baboon of the Ancient Egyptians. It comes from Abyssinia but there is a distinct race in southern Arabia. They are huge, powerfully built animals with a large mane or cape covering the whole fore-body, but their tails lack a terminal tassel. They are of a





48. *Chimpanzee*

LA TOUR



49. *Agile Gibbon and Young*

YLLA FROM RAPHO-GUILLUMETTE

→
50. *Young Hamadryas Baboon*

COMMANDER GATTI AFRICAN EXPEDITIONS

greyish color—dark in the young and females, but paler in adult males. In some areas these baboons come in contact with the Geladas, and terrific battles, amounting almost to organized warfare—with surprise raids, the taking of prisoners, wide maneuvers, and other grossly human tactics—continue over long periods. These animals were tamed by the Egyptians and were used to pick fruit; they were also sacred, and their bodies were mummified.

Silvery and Agile Gibbons

The two remaining major divisions of the Primate mammals contain about a dozen medium or large animals (including ourselves) without tails and with comparatively large brains. Apart from Men, which are today almost worldwide in range, they are confined to the forested parts of Africa and the Oriental Region from eastern India to the island of Hainan and south to Borneo, Sumatra and Java.

There are about half a dozen valid species of Gibbons, one of which is so different as to warrant a separate generic standing. This animal, the Siamang, is confined to Sumatra; the other species are spread from Bhutan in the central Himalayas through Burma and Indo-China to Hainan and south to Java. All Gibbons have long slender tusks and hard callosities on their buttocks. In these respects they are different from the greater apes and more like certain lower primates. One has been given the rather redundant English name of the Agile Gibbon (Plate 49), though it could hardly be more so

than any of the others. It varies enormously in color from a very dark brown to pale cream, and may even be particolored with a dark body and light limbs, or vice versa. These are the famous Unka-puti of the Malays, who almost invariably have one in their homes and treat it with as much affection as they do their own children, if not more. There is a related form in Sumatra, and the famous Silvery Gibbon or Wow-Wow of Java (Plate 47) is hardly distinct from some varieties of the Unka-puti.

The Chimpanzee

The "intelligence" of chimps (Plate 48) in captivity is proverbial and there is little doubt that they use their brains in the same manner as human beings. Countless observations have established the fact that chimps work out problems just as men do, and there are even cases on record of their having surpassed normal adult humans in reasoning, notably in getting a banana down from a roof in an empty room—the man swatted at the food with a pole until it fell and was smashed; the ape set up the pole, climbed it, and retrieved the fruit whole.

Chimps still live all over a very wide area in Africa, the bounds of which are more or less those of the tall equatorial and high deciduous forests. In some areas they are extremely numerous. A political officer traveling in one area of the central French Cameroon reported counting over two hundred of them between villages only fifteen miles apart.





51. *Orangutan*

LA TOUR

52. *Gorilla (immature)*

VAN NOSTRAND FROM
NATIONAL AUDUBON



Orang-Utans

These cousins of ours (Plate 51) are of an entirely different appearance, nature, and temperament. There are two kinds, both clothed in bright, reddish-orange hair; one is found in Borneo, the other in Sumatra. The Orang-Utan—meaning in Malayan simply the “Man of the Woods” or the “Wild Man,” has a mongoloid look, a complacent and contemplative temperament, and certain characteristics that are sometimes disturbingly “human.”

These creatures develop with age into gross parodies of men, with huge cheek flaps, throat sacks, repulsively obese stomachs, and grotesque little legs. Their arms are even greater in proportion to the body than those of the chimps, since these animals are more wholly arboreal. In youth, they show astonishing intelligence and sometimes traits that are rather embarrassing, for Orangs often behave like completely uninhibited human beings and, what is more, they seem to appreciate the fact that they are doing so. This is difficult to explain unless we accept the fact that they have what we call a “mentality” similar, if not identical, to ours.

Orangs are forest animals, and make every effort to stay out of the way of men, but curiously enough, when captured young but at an age when they can feed and care for themselves, they will settle down in a human household just like any human orphan. The Orangs make rough sleeping platforms like those of the Gorillas, and appear to be vegetarians, though in captivity they will eat almost anything fit for human consumption, and appear to thrive on it.

Gorillas

The Gorillas are the largest and the most specialized of the apes (Plate 52). Their heads, at least in adult males, have developed, or perhaps we should say reverted, to a baboonlike or almost doglike form, with long, prognathous muzzle and a tall, bony crest along the ridge of the skull to which huge muscles, used in crushing food, are attached. They also walk on all fours, using the outside of the feet and the knuckles.

They are found in considerable numbers over a wide area of the Cameroons and Gabun north of the Congo. Apart from a large continuous population in the Gabun, they form isolated communities often separated by very considerable distances. One of the distinct “nations” dwells in a remote group of mountains on the border of Nigeria in the far northwest; another on the volcanic peaks of Kivu a thousand miles to the east.

Gorillas will climb trees to eat certain leaves and fruits, but the oldest male usually remains on the ground—a custom which has given rise to the belief that he sleeps there. This is not necessarily so, for he may often sleep aloft, especially in the lowland forests. It appears that this greatest of the Primates, is, in fact, not the ravening ogre he has been depicted, but just a great big, easily scared vegetarian, desiring nothing more than to be left alone in his forest fastnesses to raise his solemn, quiet little kids, and be allowed the occasional privilege of marauding a human banana plantation. Two-inch, tempered steel bars have been bent by frightened Gorillas, and tales of twisted double-barreled shotguns are apparently not imagination.





53. *Hairy Armadillo*

MARKHAM

→
54. *Giant Anteater*

VAN NOSTRAND FROM NATIONAL AUDUBON

Left-Over Mammals

Hairy Armadillo

Armadillos and anteaters, together with the sloths, form a special group of mammals all of which live in the warmer parts of the new world. One species of armadillo found in Peru (Plate 53) has a thick coat of long fur overlaying the normal, horn-covered, bony shields, except for the head and tail. These armadillos are not balanced on the hind legs but on all fours. Although they appear defenseless as they trundle about the surface of the earth in search of insect food, they are one of the fastest animals afoot when finally alarmed. They can also dig with prodigious speed. Although their ears are large, their hearing is not acute. They always bear four young and all of the same sex because they are really two sets of identical twins *both* derived from a single fertilized egg.

The Giant Anteater

This grey-black animal with icicle-shaped head (Plate 54) and enormous bushy tail is comparatively common throughout most of the forested part of tropical America. It grows to an overall length of more than six feet and, despite its idiotic appearance, minute brain, and apparently lumbering gait, it is one of the most competent and least often molested of all mammals. Even jaguars give the large males of this species a wide berth, for these animals are amazingly quick and deadly infighters. Their forearms are shaped like those of a man, enormously muscled, and armed with stout short fingers bearing gigantic claws. With these they can rip open the concrete-hard nests of termites, and of course any animal. Moreover, they have a habit of waltzing about on their hind legs with unexpected agility and can then strike with their hands in almost every direction. To feed, they stick their pointed muzzles into ripped-up logs, termite or ant nests, and then flick up the insects with a foot-long, wormlike tongue covered with gummy saliva. Along with the food, a great deal of earth and dirt goes into the stomach and is used for digestion. Although it has often been denied, the great, bushy tail apparently *is* used by the animal to sweep insects together, as well as to brush them from its own body. It is also employed as a sort of combined sunshade and umbrella when the animal is resting or sleeping.



Leaping Mammals

Pikas

In mountainous districts throughout Eurasia and North America—but not in all such localities by any means—colonies of fluffy little egg-shaped animals (Plate 56) with small, rounded ears may be encountered among the loose rock of scree. These are variously known as Pikas, Conies, or Whistling-Hares. These animals are communal within the colonies and keep up a ceaseless, high-pitched to supersonic whistling among each other and between colonies night and day, a noise that seems to get right inside your head. They also have the curious habit of collecting masses of grass and other vegetable matter and making sort of haystacks of it outside the holes between the rocks in which they dwell. This is their food and they spend half their lives caring for these stores, carrying it all below if rain threatens and then bringing it all out to dry again as soon as the bad weather has passed. They bear four or five young at a time but are not nearly so prolific as the Leporids, or hares and rabbits.

European Rabbit

A well-known type that warrants a special name is the Common Rabbit of Europe and North Africa (*Oryctolagus*) which (Plate 57), although almost indistinguishable from some cottontails, has the almost unique distinction among Leporids of being a true burrowing animal. It is communal and its vast burrows interlock, forming what are called warrens. Although excellent eating, it has always been regarded as somewhat of a pest in Europe, but it now appears about to be brought under control, if not actually doomed, by the discovery of a deadly disease that can be artificially introduced into its communities. All the rest of the vast hosts of Leporids are divided between the genera *Lepus* and *Sylvilagus*, which simply mean Hares and Wood-Hares. There is no true distinction between hares and rabbits; these are simply two names that can and have been used to denote various types of both genera, and often quite indiscriminately.

Arctic and Varying Hares

The hares vary considerably in size, color and general appearance, so that anyone can spot quite a number of them. First, in the extreme north beyond the pine forests and thus out on the open tundras and even among the perpetual



55. *Varying Hare*

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56. *Pika*

MC HUGH FROM THREE LIONS



57. *European Rabbit*

MARKHAM



58. *Arctic Hare*

CANADIAN WILDLIFE SERVICE

glacier-fields right up to the northern tip of Greenland, are to be found very large hares with huge hind feet (Plate 58); these are pure white except for black ear-tips. These animals are very numerous and form the principal food of the hosts of carnivorous mammals and birds that dwell in those regions. From time to time and on a fairly regular cycle these animals greatly increase in numbers until extreme swarm conditions pertain throughout enormous areas; then they suddenly die away in one season and become everywhere rare. It has now been shown that the numbers of those animals which feed upon these hares has also to follow this rhythmical variation throughout the years. In Eurasia there are numerous kinds of hares that are hardly distinguishable from the Jack-Rabbits of

north and eastern North America. It is in the latter continent, moreover, that Leporids reach their zenith of diversity.

Here, there are the so-called Snowshoe-Rabbits, or Varying Hares (Plate 55), which in many areas turn white in winter and which have absurdly large hind feet clothed in winter in long, fluffy fur. Then there are the Jack-Rabbits or Antelope-Hares of the western prairies and deserts. These are the most exaggerated of all Leporids, having small heads, positively immense ears, and very long, narrow bodies. Their forelegs are slender and long, but their hind legs are monstrous. They are prodigious jumpers, covering over twenty feet at a leap in some cases, and their sustained speed is such that nothing short of a Cheetah can catch them.

Gnawing Mammals

BEFORE entering upon any description of the Rodents it is necessary to take a deep breath, metaphorically speaking, for this is the largest order, containing over a third of all the genera and over half the total species of living mammals. This gives us a minimum of 5,000 distinct animals that must be split up into over three hundred genera to be dealt with. Moreover, the vast majority of these are very small animals, less in size than the ordinary Brown Rat, and whole slews of these look almost exactly alike, regardless of whether they be truly related or not. In bulk of actual individual animals alive at any one time, they so far exceed all other mammals put together that any attempted computation of their numbers becomes worthless. Many of them swarm either periodically or from time to time, and on one occasion in western North America as many as 12,000 specimens of one species were estimated *per acre* over an enormous area. One permanent "city" of Prairie Dogs once covered an area of 25,000 square miles in the same part of the world, and was estimated to have been inhabited by over four hundred million individuals.

SQUIRRELS

The great group known as the Squirrels are perhaps the most advanced and successful of all Rodents, although they are still somewhat generalized. They are found all over Eurasia, Africa, and the Americas, and they come in hundreds of distinct forms that are divided into about forty genera. In order to reduce this to manageable proportions, however, it is feasible to describe them under seven heads, all of which have popular names and all of which are quite widely appreciated as constituting distinct assemblages of animals.

Typical Tree Squirrels

The general form of the typical tree squirrel is sufficiently well shown in Plate 61 and does not need any detailed description. There are well over two hundred described forms found wherever there are woods or forests all over Asia, Europe, Africa, and North and South America. These have at one time or another been broken down into a score of genera, but apart from two obscure forms in central Asia, one in Borneo and one in South America, which display demonstrable anatomical differences, they are all as one, structurally. In size, color, and color pattern, however, they vary greatly. In habits they are surprisingly alike. They eat nuts,

fruits and insects. They live in trees but descend to the ground fairly frequently, especially in temperate climates or where the trees are stunted or stand apart, and they all make nests either in holes in trees or, in the manner of birds, out on the open branches. In colder climates they often go into permanent or semihibernation and in the drier parts of the tropics some of them aestivate. Most of them have several broods of a number of young during the year, but the colder the climate the more numerous the offspring and the more concentrated the breeding season. All are distinguished by having long and bushy tails, though the bushiness varies from the slightest to an extreme of several inches, giving the owner a regular sun shade—*sciurus* means "shade-tail." They are mostly sleek-furred and rather brightly colored, and many, like the common European Red Squirrel and certain species in the west of North America, bear pronounced plumes on their ears. They are agile and use their hands to handle food and raise it to their mouths. They descend trees head first.

The Chickaree

The little Red Squirrel of the North American pine or boreal forests (Plate 60) forms a quite distinct tribe, and is truly unlike the above. Not only is it smaller, but its general build is more compact, its teeth are different, and its habits are somewhat dissimilar. It is an eater of pine cones and it hibernates.

Northern Ground Squirrels

The larger of these are better known to Americans as Groundhogs or Woodchucks, but the tribe actually includes also the Prairie Dog, the vast host of true Ground Squirrels or Gophers, and the Chipmunks. They are distributed all around the northern hemisphere from above the Arctic Circle to the southern limits of the temperate belt. The largest are the so-called Hoary Marmots of Alaska (Plate 63), which, like the Groundhogs and the Marmots of Europe and Asia, have short tails, great heavy bodies and rather short limbs, and which live in holes that they themselves excavate in earth or among the rocks of mountain scree. They have thick, coarse fur, and all hibernate during the cold months of winter.

The little Prairie Dog (Plate 59) is a truly gregarious animal, resembling a very fat rat with a short tail, and living in enormous communities on the open prairies of western North America. They are sandy brown in color and spend much of their time sitting up on their haunches. They dig burrows with vertical entrance shafts in the middle of a sort of small volcano of earth on which they sit. At the slightest sign of danger they stand up on their hind legs and give a high-pitched cheer and then duck down into their burrows. Their hole has a sort of antechamber near the top and in this the

→ 59. *Young Prairie Dog*

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60. *Chickaree*

CRUICKSHANK
FROM NATIONAL AUDUBON

61. *North American
Grey Squirrel*

MARKHAM





62. *Mantled Ground Squirrel*

SNIDER FROM SHOSTAL

animals turn around and then emerge to peep over the rim. They maintain their families on the small plot of grass growing around their mound.

All over the treeless areas of northern Asia and North America and in the latter as far south as central Mexico, dwell countless hosts of little ground-living squirrels to which the names *Susliks* or *Gophers* (Plate 64) have been given on the two continents respectively. They come in more than a dozen basic forms, and although most of them are of a dull, greyish-brown color, some show the most vivid markings. The Mantled Ground Squirrel (Plate 62) of western North America may be of a combined olive brown, orange, reddish, black and white pattern, and the Thirteen-lined Ground Squirrel (Plate 66) of the deserts is quite unique, being light below but reddish above, with seven bright white longitudinal lines over the back and flanks with six lines of white spots between them. Most of these little animals take refuge in holes of other animals, but some of them dig their own. They eat grass, seeds and roots, but all of them will take insects and many eat snails and other animals. The most engaging is the Flickertail (Plate 65).

The Chipmunks are, in a manner of speaking, only an extension of the Gophers that dwell in the forests and woodlands rather than out on the plains, and they are linked to them via such types as the Mantled Ground Squirrel. They are lighter-bodied, on an average much smaller and more active, and their tails are more bushy and squirrellike. They vary enormously in color, but are mostly greenish-brown, and all have on the flanks more or less of a light stripe bordered by black, and similar marks enclosing the eyes. They are extremely busy little animals throughout the warmer months, raising families and collecting nuts and other food that they stash away in hidden hoards under tree stumps and elsewhere. Fortunately they forget where most of these hoards are and never make use of them in the lean months during which they hibernate fitfully. As a result, their activities do much to foster the re-afforestation of the land and to promote the distribution of nut-bearing bushes and other plants.

Beavers

An animal that has intrigued men since prehistoric times and has greatly influenced his life in several respects is the



63. *Hoary Marmot*

MILLER
FROM NATIONAL AUDUBON



64. *Common
Ground Squirrel*

HARRISON
FROM NATIONAL AUDUBON



65. *Flickertail*

HARRISON
FROM NATIONAL AUDUBON

→
66. *Thirteen-lined
Ground Squirrel*

EVANS FROM THREE LIONS

Beaver (Plate 68). Once found all over Europe and North America from the retreating front of the glacial ice-cap to the southern limits of the temperate woodlands, it is now almost extinct in Europe, and greatly reduced in numbers in North America. There was even a time when it was considered threatened with extinction in the New World, but new ideas of conservation and some public enlightenment have saved it. It now shows signs of rehabilitation throughout much of its original range in localities that have not been taken over by man and his works.

The appearance of the Beaver is well known and its behavior and habits are just as widely known but are sorely misunderstood. At first sight the Beaver and his works appear to indicate the exercise of an intelligence akin or identical to our own, and this is particularly intriguing to men, since the results are technological and we are basically technologists. On closer investigation, however, the activities of these animals lose much of their practical wonder, but in doing so they become even more mysterious. Although, like men, they work together in family communities with full co-operation and

considerable discipline under the guidance of experienced individuals, and thereby accomplish engineering works of prodigious extent and great accuracy, they appear to do the whole thing entirely mechanically. Captive Beavers will work ceaselessly at these same activities when there is no need for them to do so and even when they can not achieve anything by so doing.

The whole business of cutting timber, hauling stones, building dams across running streams, digging and transporting special mud to plaster them, excavating long canals to bring additional water, erecting vast houses with complex entrances, internal flooring and other devices, and spending months of labor cutting special sticks and anchoring them in the mud at the bottom of the artificial ponds, is directed at but a single objective—namely to provide a safe winter home with ample food supply under the winter ice in which to raise young.

How the Beavers do this brings up the everlasting question of the difference between instinct and reason, and it is here that we come upon the real mystery. Despite their purely au-



tomatic and apparently mechanistic activities, and their lack of practical forethought, beavers appear to draw upon sources of information that are beyond our ken. How else can they so accurately judge the height of floods that are not to come for several months; how do they know so exactly how far water is going to be backed up by a dam and just what stresses and pressures it will exert? Can such knowledge be the result of cumulative racial experience, and if so how is it transmitted from generation to generation? Is it, too, entirely mechanical, or does it indicate a form of intelligence other than our own? Whatever be the cause, the effects have been far-reaching throughout the whole area where beavers have dwelt and labored since the retreat of the ice-cap.

By damming streams beavers create ponds, but since these rapidly silt up, their work is unending, and, throughout the millennia, millions of acres of pasture land have thus been created where only sterile rocky river courses would have otherwise been. Further, by raising the water table all around their ponds the plant growth of much larger areas is com-

pletely altered; the conifers are pushed back and broad-leaved trees allowed to take hold. Thus, enormous areas of the best soil and pasture in the homelands of the white man and in those countries which he has colonized—northern Europe and North America—would never have existed had it not been for the Beaver.

Two to eight kittens are born in the early spring in the lodge which stands in water but has a dry platform above water level within. The parents care for the young for a year. Their food is the bark of certain trees and bushes, and great stores of these are laid in for the winter by pulling them down to the pond bottom and then anchoring them in the mud.

Kangaroo Rats

In the drier parts of Mexico and thence north to California, Idaho, Wyoming and Oklahoma, there dwell vast hosts of small rat-shaped animals with large heads and huge eyes, tiny front legs and immense, stiltlike hind limbs (Plate 67). Their fur is silky and long, so that the arms may be completely

67. *Kangaroo Rat*

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68. *Beaver*

GARST

concealed underneath it when the animal is in motion. The hind feet have a brush of long, stiff hairs all over the soles, and the tail is often longer than the head and body and has a big terminal tuft. This is used as a rudder to make sudden turns when the animal is going flat out by a series of terrific leaps. In color they are all greyish-brown above and pure white below, with black facial markings and a white line around the rump. Some grow to an over-all length of eighteen inches. They are nocturnal and live in holes by day. Together with the pocket mice and spiny rats they form another family of North and Central American rodents that are related to the Sciurormorph group though all its members are of small size and either mouse-, rat-, or Jerboa-like (see Plate) in appearance. They have fur-lined cheek pouches like the Pocket Gophers.

Rats and Mice

The Mouse-shaped rodents form the core of the great order of Rodents and far surpass the other two groups both in numbers of species and genera. The biggest is only a little over a foot long. We may well ask of what possible use or even interest they can be to anybody and, at first sight, they do appear to constitute an almost endless and most dreary confusion. However, as in almost all aspects of nature, the more one studies them and the closer one looks into their lives, the more remarkable, fascinating, and important they become. The group comprises ten quite separate kinds of animals, two of which (the Cricetids, or "Squeaking Ones," and the Murids, or "Mousy Ones") are closely related. These may be known as the "Ancient Mice" and the "Modern Mice," respectively.





←
69. *Common Hamster*

MARKHAM

Hamsters

The first of the "Ancient Mice" that are popularly known are the Hamsters. Because of its introduction as an experimental laboratory animal during World War II, one species of Hamster is today fairly well known to the public. This is a small, richly colored, reddish-orange and yellow species with dark facial markings, that comes from Syria and Palestine. Until now, Hamsters have been of interest only to people in Middle Europe and Russia, where certain much larger species have, throughout the centuries, caused immense damage to standing crops. Periodically, these large rodents (Plate 69), half the size of a rabbit, become extremely numerous over large areas, and they may then literally mow down a field of wheat, oats, barley, or other grain crop in swathes, chopping every stem off to the ground. They build complex underground dwellings.

Deer Mouse

Of this seething mass of tiny, nondescript animals, a few stand out as being at least recognizable to the layman. Most typical of the whole lot, and one of the first to be discovered, is the delicate little White-footed or Deer Mouse of North

70. *Cape Pouched Mouse*

MARKHAM

American woodlands (Plate 71). This is just a tiny mouse with big ears and light undersides and a moderate tail. It swarms throughout the country and does a great deal of good by keeping down the insect population.

Snow Lemming

We now come to the second largest conglomeration of the Ancient Mice, and one that is almost universal in distribution all over the Northern Hemisphere. The hundreds of species are divided among some twenty genera, and these in turn can be grouped as Lemmings, ordinary Voles, Water Rats, and Mole Voles. Among these are several well-known, important, and truly popular animals. It is a sort of tradition among zoologists to start off any discussion of the Voles with the Lemmings (Plate 72), and it is just as well to dispose of this troublesome matter as soon as possible. There are many different kinds of Lemmings, and they are grouped into four lots—namely, the Common Lemmings, the Snow Lemmings, the Bog Lemmings, and a rare Eurasian type. All are small (about five inches long), fat, compact little animals with thick, rather fluffy fur, small ears almost completely concealed un-



71. Deer Mouse

JAHODA FROM F.P.G.

der the fur, long front claws and very short, haired tails. They all live in or around the Arctic circle.

The most interesting of all these are the Snow Lemmings (*Dicrostonyx*) which turn pure white in winter and burrow under the snow or even meander about on its surface in the dead of the Arctic winter. In the fall each year they grow an enormous second claw under the permanent one on the third and fourth fingers, a unique characteristic among mammals. Its purpose is not definitely known, but would appear to have something to do with their snow-shoveling activities. In summer they are referred to as Collared Lemmings. They can close their ears with a comb of stiff hairs controlled by special muscles in the hind cheeks. The Bog Lemmings are rather dull little creatures that live in moist places south of the range of the two former types.

European Field Vole

The main body of the Voles is represented principally by two great genera known to science as *Microtus* (Plate 73) and

Clethrionomys, meaning the "small-eared" and the "bolt-toothed" respectively and called, popularly, the Field Voles and the Red-backed Voles. Despite their enormous numbers, there is little to be said about these small rodents. They live on the surface of the earth or slightly under it, either in their own burrows or those of other animals. They eat all manner of seeds, small nuts, insects, and some herbage. Some make nests and store food, others live in hollow trees and climb well, while many of them make great complexes of permanent runways under grass, covering about the area of a tennis court. They breed very rapidly, some having up to eight young at three-week intervals, and the youngsters begin breeding in another five weeks. As a result, some of these animals also swarm from time to time and it was a *Microtus* that once inundated vast areas of the West to the estimated number of 12,000 per acre.

Sand Rats

The last great division of the Ancient Mice are desert animals (Plate 74) found in eastern Europe and the drier parts of



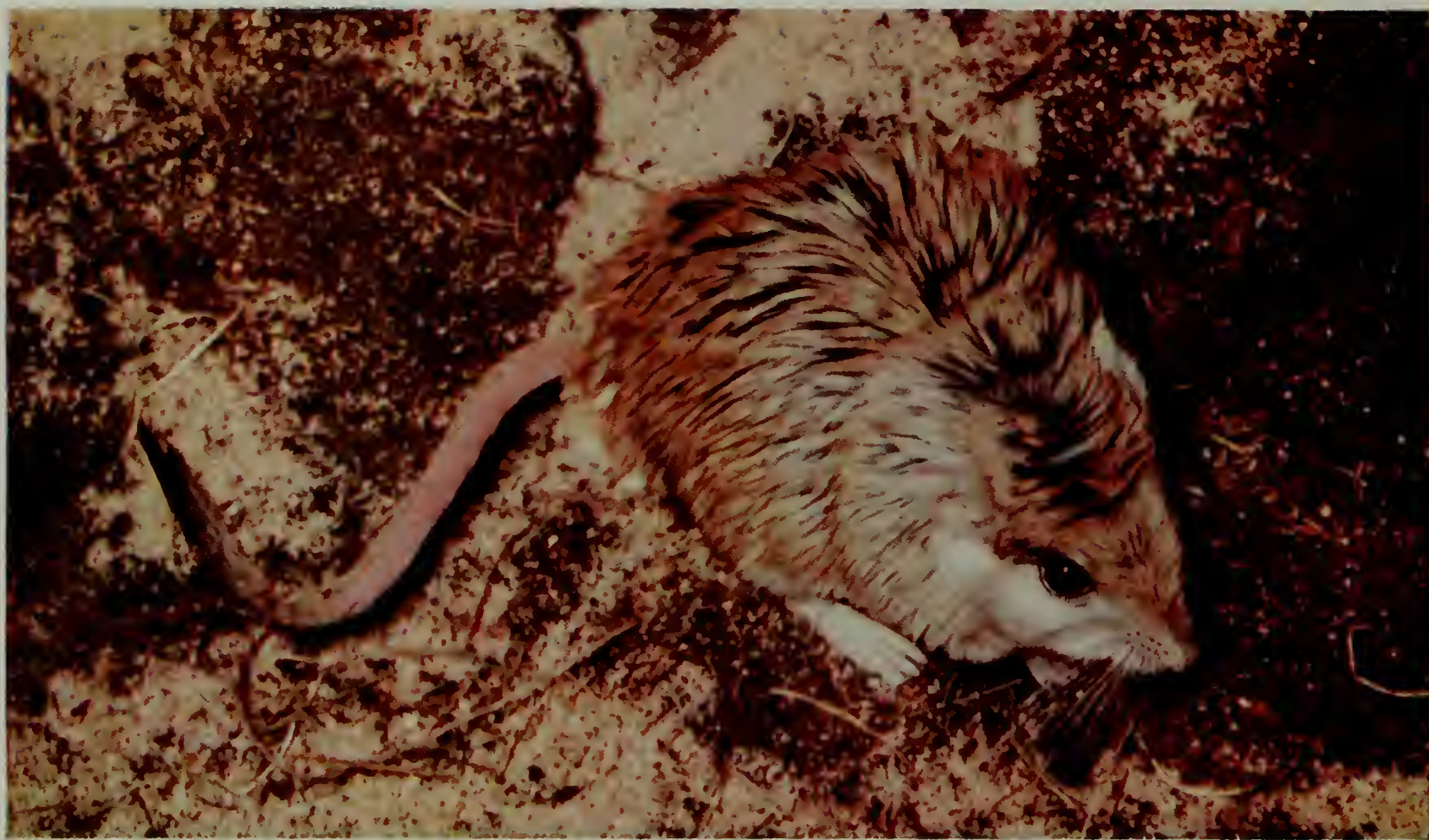
72. *Snow Lemming (summer phase)*

MARKHAM

73. *European Field Vole*

MARKHAM





74. *Sand Rat*

MARKHAM

Asia and Africa. They are divided into about a dozen genera, often on grounds that do not seem warranted but need not concern us here. They are all small animals, ranging in size somewhere between mice and rats. They are root and seed eaters, and burrow industriously under desert grass and scrub. The Indian Gerbil takes the place of the voles in other countries, being enormously prolific, having sometimes as many as fourteen young at a time, and occasionally swarming. In the year 1878 such a swarm totally destroyed all crops over an area of about eight thousand square miles in one part of India by literally mowing down the standing grain stalks.

Muskrats

Muskrats make large, dome-shaped nests above water level, using a most odd construction method. They take sodden reeds and other water plants and roll them into little oblong bundles like a roll of string, and fit them together between growing reeds or other supports, leaving a single concealed entrance. In these they rear their young. They are harmless animals living in swamps and keeping out of men's way, though they are still so common that they live and nest within the limits of many of the greatest cities in America. Economically, muskrats are of the utmost importance since their pelts form the basis of the modern medium-price fur market, being durable, waterproof, abundant, and sturdy enough to be "dropped" so that the small rectangular skin can be finished as a long narrow strip.

Black and Brown Rats

The most notable, and therefore the first to be mentioned of the modern mice, are the animals commonly known simply as rats. Of the more than seventy different kinds of Modern Mice, the members of the genus *Rattus* call for first notice. There are, according to Dr. Simpson, more than 550 currently recognized forms of this genus. All were originally Asiatic animals, but two, and probably more, have been carried by man, have followed man to, or have simply colonized on their own account, almost every land area on the earth exclusive of the Antarctic and some islands in the Polar regions. The two most concerned in this worldwide occupation are the Black Rat (*Rattus rattus*) (Plate 81), which appears originally to have been an arboreal species from Indonesia, and the Brown Rat (*Rattus norvegicus*) (Plate 80), which was a fossorial inhabitant of the treeless steppes of Central Asia. The former started its mass emigration first, probably in Roman times or earlier, and probably did so primarily in ships and in cargoes of tropical fruits and other edible produce. It then came ashore along ropes and cables and took to dwelling in the tops of houses and granaries. The Brown Rat came much later, probably first moving westward with the Slavonic and Mongoloid hordes that swept into Europe. Being a terrestrial animal and a digger, it took refuge in the basements of buildings, ousting the Black Rat.



75. *Muskrat*

MCHUGH FROM THREE LIONS



76. *House Mouse*

MARKHAM

77. *Spiny Mouse*

MARKHAM



Since their arrival in foreign lands the fortunes of the two animals have depended on man's changing ways.

House, Spiny, and other Mice

Next to the typical rats both in numbers, versatility, and breadth of distribution come the tiny mice (genus *Mus*) (Plate 76). These delicate little animals, of which there are probably as many recognizable forms as there are of *Rattus*, are indigenous to Europe as well as most parts of Asia and of Africa, in one form or another. Today, they have for so long been carried back and forth all over the surface of the earth by men, and they are such adept interbreeders that it is quite impossible properly to unravel them taxonomically. Although the so-called House Mouse does a certain amount of damage to human property, makes a mess, and may transport filth

and some diseases, it is really a very pretty, delicate, and cleanly little animal, and it probably does more good than harm in the over-all picture by clearing away "crumbs" and by keeping down cockroaches and other more dangerous pests. The habits of mice are too well known to warrant elaboration, but it is not generally appreciated that they can survive and breed under many extreme conditions. They turned up in a winter camp on the Antarctic Continent and have been known to breed in deep-freeze plants and in parts of chemical plants that are lethal to humans. A pair were found nesting in General Rommel's personal possessions in his tank in North Africa during his World War II campaign against Egypt.

Mice—in the pure sense—come in an incredible variety of forms, even under natural conditions. The smallest is the tiny



78. Root Rat

MARKHAM



79. *Cloud Rat*

PINNEY





81. *Black Rat*

MARKHAM

←
80. *Brown Rat*

YLLA FROM RAPHO-GUILLUMETTE

European Harvest Mouse (Plate 83). There are silky, woolly, hairy, spiny, and even prickly-furred species, and even in the genus *Mus*; then there are typically spiny forms (*Acomys*) (Plate 77).

Root Rats

In Tibet, northern India and thence east to China and south to Malaya and the large Indonesian Islands there are to be found a number of similar animals which, however, belong to quite another family. They are popularly known as Bamboo Rats (Plate 78), living under grass, among tree roots, or in the piles of rubbish among the stems of Giant bamboo clusters. The Indian species are about a foot long, but in the islands there is a giant race almost twice the size. They mostly have minute eyes, but these are not covered by skin,

and they have small naked ears and a short tail. Another kind is found in Abyssinia in East Africa. They are nocturnal animals and prodigious eaters.

Cloud Rats

We here meet a group of some half-dozen genera of odd rats that are distributed as follows: two in New Guinea, two in the Philippines, one in the East Indies, and one on the mainland of Asia. One of these genera has representatives spread from the Philippines to New Guinea and thence to Australia, so that the famous zoological gap between the continents of Asia and Australia is more or less bridged. *Phloeomys*, the so-called Rind Rat, is a large, long-haired species with very odd teeth; it lives in the lowlands. Others (Plate 79) with strange, parti-colored black and white hairs not unlike



82. *Common African Jerboa*

MARKHAM

the Crested Hamster, live in the mountain mist-forests; others are aboreal.

Pouched Rats

Even then, the catalogue is far from complete; there are pouched mice (*Saccostomus*) in Africa (Plate 70), and also bulky and obese forms like the Bandicoot Rats, of southern India (*Bandicota*) and the gigantic specimens of typically rat-like form from West Africa (*Cricetomys*) which for some foolish reason have been called Hamster-Rats. Nothing could be further from reality, for they are less like a hamster than almost any other rodent. These animals have all the native cunning and educational ability of the Brown Rat combined with much greater size and strength. They also have the added ability of the Cricetine Pack Rats to build houses, collect, transport and store material, and they employ a sort of communal nursery system by which they can save orphans.

Jerboas

Herewith we come to a group of most engaging little animals that used to be quite well known as pets not only in Europe but even in America. They have intrigued civilized men since the time of the earlier dynasties of the Ancient Egyptian Empire, whose royal artists sometimes included them in their murals in temples and tombs. From those depictions there

once arose, by simplification of lines, a hieroglyph meaning "swiftness." There are a very large number of different species of a dozen distinct genera and these may be divided into three major groups on fairly technical grounds.

They are desert animals and are found all over the drier parts of far eastern Europe, Russia and central Asia, western Asia, and North Africa. The identification of any particular Jerboa is a matter for specialists only, but for others who may be interested there are certain clues that may help to some extent and which are interesting in themselves. First, in Eurasia there are Jerboas with five toes and others with only three; also there are in Asia those with short ears, and some in Yarkand that have very large, long ears shaped like those of tiny rabbits. There is also one rare Asiatic kind that has a curiously flattened tail like a horizontal paddle. In Africa also there are those with small rounded ears and others (*Scarturus*) with enormous, batlike ears that can be opened out like two huge, loudspeaker horns, or folded up and laid back alongside the shoulders when the animal is going in top gear. And Jerboas have a regular set of gears too—they can walk backwards or forwards, pace along on their stiltlike hind legs, or change suddenly into full-flight by leaping with both hind legs together. When they do this, they go off over the sand at such speed the human eye can hardly follow them.



83. *European Harvest Mouse*

MARKHAM



84. *Common European Dormouse (semi-albino)*

MARKHAM

The form of the common African type (*Jaculus*) (Plate 82) is, except for the shape of its ears, typical of them all. The fur of Jerboas is rather long, extremely soft and silky, and is always some light beige color above and white below. There is almost always a dark facial mask and the tuft on the tip of the tail is usually black, black and white, or white. Jerboas range in size from about three inches, with a six-inch tail, to ten inches, with a foot-long tail. They dig with their teeth, live in communal burrows, and in the northern part of their range they hibernate, while some in the true desert regions of the south aestivate. They come out in millions after rain to feast on insects and the herbage that springs up with miraculous speed on the deserts as soon as any moisture is available. Crossing some deserts at night in a car at such times may disclose an amazing sight in the headlights, at the extreme range of which the little Jerboas will be seen flying off in countless droves. In captivity they have a strange love of all kinds of brooms and often make nests in them.

Squirrel-tailed Dormice

There are five genera in this group, typified by the so-called Common Dormouse of continental Europe (Plate 84). This is a six-inch animal with a five-inch tail, clothed in thick, soft, ashy grey fur above, and pure white below. The tip of its snout is white and it has dark "spectacles." It is found from northern Germany south to Spain, Italy and Greece, and east to Russia in the north and Syria in the south. It nests in holes, either in trees or in the ground, and in the north hibernates for about seven months out of every year. It eats insects and other small animals, as well as nuts, and is itself extremely good eating, especially when fat and ready for hibernation, as the Romans long ago discovered. The young grow at an incredible speed—they have to, when the parents have only five working months out of the year. The Asiatic tree Dormouse (*Dryomys*) is smaller, reddish above and white below.



85. *Hazelmouse*

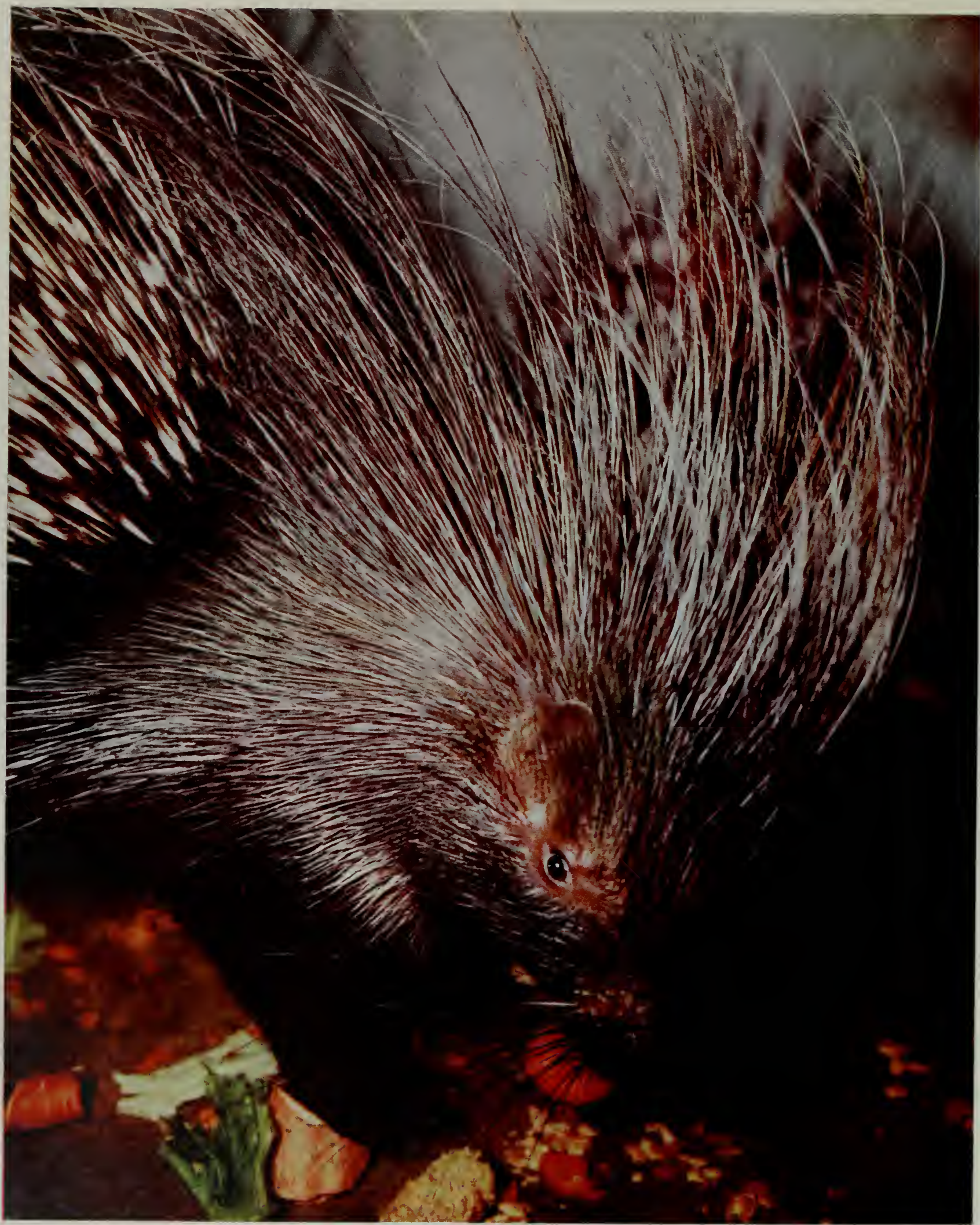
MARKHAM

The Hazelmouse

The oddest form of Dormouse happens to be the best known, and is one of the commonest smaller mammals of western Europe (Plate 85). It has particularly interesting habits and engaging ways and has, for centuries, been a pet of German, British, and French nature-writers, and small boys, so that it has been presented to the world at large as "The Dormouse." It is about twice the size of a house mouse, three inches long not counting a three-inch tail, has large, bulbous, jet-black eyes, a wide head, and soft, close, silky fur dark at the base but a beautiful shade of rich brown at the tip. The tail is slightly compressed from top to bottom and is clothed in short fur the same color as the body. Underneath, the animal is lighter, ranging from pale buff to pure white. Hazelmice are found all over Europe from Scandinavia and Britain to North Italy and Transylvania.

They live among bushes, not trees, and make two kinds of nests: during the summer, small spherical ones, low down; in winter, much larger ones in the center of dense, evergreen vegetation, and in these they store a mass of food. In the fall, they store up fat in their bodies and then go into a profound form of hibernation, from which they can be aroused only with difficulty. When they are up, however, they have a meal from their food store and then go right back to sleep with their tails curled over their heads. The young are born in the large nests, in spring in the north and in fall in the south. As their name implies, they are particularly fond of hazelnuts, which they can empty through a single tiny hole bored in one side with their front teeth.

The Dormice are divided into seven genera, one of which is African and typically sciuromorphic; and others varying greatly from small, mousy creatures to truly arboreal animals with long, bushy tails.



86. *Mediterranean Porcupine*

PINNEY

87. *East African Porcupine*

MARKHAM



Porcupinelike Rodents

All the remaining Rodents belong to the Porcupine-shaped tribe and there are vast numbers of them of much more varied appearance than either the Squirrel- or Mouse-like ones. They are currently divided into fifteen families, eleven of which are exclusively American, and four of which are exclusively of the Old World, while three of the latter are found in Africa only. However, there are valid arguments for reducing the American families to half this number by combining the five short-tailed guinea-piglike types in one, and the three long-tailed kinds into another compound family group. The trouble is that the Hystricomorph tribe is probably a compound assemblage itself, while the animals thus grouped together are mostly remnants of vast hosts of creatures that have become extinct and left no remains that we have so far unearthed. Most of these animals are fairly well known, have popular names, and may often be seen in zoos.

Crested Porcupines

These are the largest of the Porcupines, and the four species are distributed over Africa, west and southern Asia, and throughout parts of southern Europe. The Great Crested Porcupine of the Mediterranean periphery and West Africa (Plate 86) grows to a length of twenty-eight inches, but has a tail only four inches long. The quills on the tail are hollow; those on the body are of two kinds—long, thin, and flexible, alternating with short, rigid, and sharp-pointed. The great plume on the head and the mane are composed of pliable bristles. The long body quills are white at base and tip and banded black and white between; those of the tail are white, but on the hind body the short spines are all black.

They are nocturnal animals which sleep by day in caves, in holes of other animals, between rocks, or in burrows of their own making. They eat all manner of roots, bark, fallen fruits, and a certain amount of coarse greenstuff, and are enormously powerful brutes with gnawing and grinding teeth, and jaws and the appropriate muscles to work them that surpass all but the carnivores in strength. They are not aggressive but they are extremely arrogant, wandering about at night mumbling, grunting, and rattling their quills. This is part of their

defensive mechanism, a proclamation to all and sundry that they are dangerous customers. However, these animals have extremely thin and delicate skins and are actually most vulnerable to attack by any animal that knows them, for their heads are almost entirely unprotected and they will succumb to a single blow across the muzzle. Nonetheless, if cornered they will put on a great show which can be most unpleasant or even disastrous to an attacker. They are really very quick-moving animals, can waltz around with remarkable speed and then suddenly rush backwards at an attacker, with quills and spines bristling, and if they make contact numbers of the latter become detached from their skin and lodge in their opponent. Meantime, they stamp with their back feet and growl, which is most unnerving and distracting.

South of the Sahara and ranging from the Gabun to Kenya and thence south to the Cape, this genus is represented by the largest of all porcupines (Plate 87), which is often over thirty inches long including an eight-inch tail covered with long, white spines that the animal rattles in rodential rage at the approach of anything from a locust to a lion. Throughout the Near East from the Caucasus and upper Iraq, through Persia to India and north to Turkestan, another large species with a pronounced white collar is to be found in rocky areas, though it is seldom seen since it is strictly nocturnal and very wary and rather silent. Closely related is still another species which ranges to the east through India from Kashmir to Ceylon and east to Bengal. This is about thirty inches long and has a four-inch tail when full grown. In this species the tips of the hairs, spines, and quills of the cheeks, and a collar round the neck are white; those of the body are black below and white throughout the terminal half, and those on the tail are pure white. They are very common animals in India and do immense damage to root crops, standing grain, and fruit trees.

The Mara

This animal is an inhabitant of the open, dry pampas plains and other treeless semideserts of the Argentine and Patagonia. It is a comparatively large animal (Plate 88), as tall as a terrier, and is extremely swift. Like most other members of the long-legged, cursorial rodents of South America, more-



88. *Mara*

PINNEY

over, it is very nervous and hysterical, leaping away without regard to anything if suddenly disturbed, and often meeting with serious accidents and even sudden death as a result. Like many deer and other hoofed animals, Maras use the white rump-patch as a signaling device among themselves, its display being a warning to its own kind, who then follow this "flag" in their headlong flight. They are pure vegetarians and are diurnal, often basking in the brightest sunlight all day. They have long, languorous eyelashes to protect their eyes from the sun's glare. They dig their own burrows and sleep in them.

Capybaras

This animal (Plate 89) is rapidly becoming the best-known gnawing mammal through its appearance in many zoos, and also because it is the largest living rodent. Old males sometimes measure almost four feet over the curve of their backs, from their somewhat horselike muzzles to their button-sized tails, and, in at least one case, weighed as much as 220 pounds.

Their bodies are covered in very coarse bristles like those of a hog, and they are without doubt the most mild-mannered, pompous and, from our point of view, dignified of all animals. In the wild they live mostly near water, and although they are cautious beasts, they will sometimes stand in disdainful silence and well-ordered ranks on the bank of a river, and watch a rowdy motorboat chug by; in captivity, however, they quickly adapt themselves to the ways of the household and take up a position of gentle determination with regard to all its members, including dogs. The author encountered one in Suriname trained as a reliable "seeing-eye" by a blind Boer farmer. They apparently have an IQ equivalent to that of the pig, which comes second only to apes and ourselves. They are grazers and browsers, and spend a lot of time just sitting complacently on river banks and blinking. The females bear half a dozen young a year, in one, two, or three litters. They all follow the mother about for many months. Males usually have small harems of females of various ages and take many years to reach full size.



89. *Capybara*

MARKHAM

Pacaranas

A very unexpected creature was found wandering about in the backyard of a house in a small township in Peru in the year 1872. Nothing like it had ever been seen before by anybody except the natives of a few remote areas in South America, and nothing more was seen of it for some decades. It is still a great rarity in collections, but has now begun to turn up alive from time to time. As Plate 90 shows, it is rather an appalling-looking beast, covered with large spots and having a long tail. Nothing much is known of its habits in the wild state except that it digs, is a vegetarian, and can put up an unexpectedly stolid defense when cornered. In many ways it links the Cavies, Capybaras, and the Pacagoutis on the one hand, to the long-tailed Hutias and Degus, to be described later, on the other. It has a cleft upper lip, and only four fingers and toes. Its tail is clothed in coarse hair.

Cutting-Grass

This large, cumbersome rodent (Plate 91), found all over Africa south of the Sahara in woods and other vegetation outside the forests, but not on open savannahs, dry scrub or desert zones, is commonly called the "Ground Rat" or the "Cane Rat." However, it is not a rat, being more like a large, dry Coypu, and although it lives on the ground, it does not seem to have any special predilection for *canes* of any kind even if they are available. It is a garbage or dropped-fruit eater, as well as a general vegetable browser, and grazer—hence its most descriptive West African pidgin-English name.

It grows to a length of almost two feet, is very heavy-bodied and has a short, seven-inch and very thick tail. It makes large, strongly woven grass nests in depressions under the densest vegetation and bumbles about at night making a most remarkable noise. This sound is like that of a heavy pebble dropped on a frozen lake and has the same metallic ring as the note of the Indonesian "Brain-fever Bird." The noise made by both these animals can indeed drive one insane since there is no logical sequence to the issuance of the "boings."





←
90. *Pacarana*

LA TOUR

The natives of the countries where the bird and the Cutting-Grass are found bet on both for hours every night on the number of "boings" to come next. The Cutting-Grass also makes a curious thumping noise, but whether this is done with the feet or emanates from the throat is not known. It never comes with the "boings" but goes on intermittently most of the night. The teeth of the Cutting-Grass are very sturdy and the two upper front ones have three deep grooves down their outer surfaces; the lower front ones are smooth chisels. They have been known to tear holes in corrugated iron fences.

The Acouchi

Smaller than the well-known Agouti and having a tiny, slender tail bearing a little plume of white hairs, the Acouchi (Plate 92) of Guiana is an altogether different animal. Al-

91. *Cutting-Grass*

MARKHAM

though even more slender and delicate and supersensitive, it is altogether less hysterical and can be tamed, whereupon it shows remarkable intelligence and even apparent affection for those it trusts. It is a very rare animal and little is known about it. It appears to live among marsh herbage in certain very limited areas. The coarse but beautifully colored hairs on its hinder back may be six inches long and can be raised at will. This is done when the animal is alarmed, when it also drums with its back feet and grinds its teeth.

The Coypu

We now come to a remarkable collection of "living fossils" with a very strange distribution. As a group they are hard to define, but their general form may be seen in the accompanying photograph of the Nutria or, as it is better known, the Coypu of



South America. To most people they look like enormous, fat rats; to anatomists they present quite another picture. Five of the living types are isolated on various of the West Indian Islands, where they represent the only indigenous mammalian land fauna apart from bats and the Solenodons. A sixth is isolated in the mountains of northern Venezuela, and the seventh, a rather different animal with the delightful name of *Myopotamus coypu*, is widely distributed in southern South America. It has been introduced to North America and is known to all discriminating women as the fur "nutria."

This large, aquatic rodent (Plate 93) is a native of South America, from Peru almost to the lower extremity of the continent and is found on both sides of the Andes but outside of the forests. The heavy-set body reaches more than a foot in length, and the tail is about half that length. It is covered in a very fine underfur—the "nutria" of the fur trade—and this is, in turn, covered by a long coat of coarse overhair. They have five toes and fingers, the former completely webbed. They make shallow burrows in pond and river banks with an enlarged nesting chamber at the back, and they produce up to eight young at a time; these have the happy habit of riding on their mother's back when she swims. They are vegetarians but of rather a special nature, as has been proved since they were introduced into North America. This was first done in 1899 without results, and then again, unsuccessfully, in the early 1920's. The animals were then released and found a niche for themselves in much the same areas as the indigenous muskrats, but they never have interfered with those animals and have established themselves over large tracts of suitable marshy territory in Mississippi, Louisiana, Texas, and in Washington state.

92. *Acouchi*

PINNEY

93. *Coypu*

MARKHAM



Fin-Footed Mammals

94. *California Sea-Lion*

LA TOUR





95. *Northern Fur Seal*

KENYON FROM NATIONAL AUDUBON

THE seals are universally recognizable and form a compact little group of aquatic mammals that cannot be mistaken for any other. There are only about a score of recognizable species and they are all very much alike in external form though they display a considerable range in size. They are usually made a suborder of the Carnivores and they almost certainly sprang from some animals that were common ancestors of both. However, they are today so different from all living Carnivores that they must be treated quite separately. Also, apart from one fossil form, which may have been a seal-like otter, or an otter-like seal but is not a missing link and therefore does not indicate any true relationship between the two, no animal living or extinct gives us any real clue to their origin. At most they may have sprung from the very earliest doglike Carnivores; otherwise, they had their origin farther back in time and down the genealogical tree. In either case this sets them apart from all other mammals.

The classification of this homogeneous little group of animals presents several difficulties. It is primarily obvious that

there are two major kinds of fin-footed mammals, and these may have quite separate origins. The first we call here the Sea Lions though this contains the eared Fur Seals and the mighty Walrus, in addition to the long-necked, small-eared Sea Lions proper. In purely popular parlance these might well be called Sea Lions, Sea Bears, and Sea Sabertooths, for the Walrus bears just such a relationship to the others that the extinct Sabertooths held to the Cats and Bears. The second group contains all other seals, including the enormous Sea Elephants.

Sea Bears

There are two distinct genera of Sea Bears or Fur Seals, one (*Arctocephalus*) being found on islands all round the Antarctic and on the southern extremities of South America, Africa, and Australia, and about New Zealand. The other (*Callorhinus*) is confined to some islands in the Bering Sea in the North Pacific (Plate 95). Like the Sea Lion, the males of these animals are much larger than the females and occasionally veritable giants may be found among them. The males of the Northern species measure over six feet, the females under

four. Then again, the males develop enormous domed heads and have a habit of raising the front part of their bodies straight into the air, giving them a most menacing appearance. These animals roam all over the ocean throughout the year but all assemble at a set time for a brief breeding fiesta on the Pribiloff Islands in the North Pacific. The males gather large harems of females and guard them with the utmost vigor while an assortment of young, weak, and old males are forced to live in bachelor circles.

Their pelts are of great value as these are clothed in a dense yellowish underwool and a firm shiny overcoat.

Common Seals

The best-known species is usually called the Harbor Seal and is distributed all over the northern Atlantic and Pacific

Oceans ranging from the ice front (which the animals do not make use of) to the Mediterranean and southern New Jersey in the Atlantic, and to California and Kamchatka in the Pacific. They are small animals, averaging about six feet long, that live in small colonies of a few families about fixed locations all along the coasts and especially where there are rocks, and about islands. Nonetheless, these seals often come swimming by sandy public bathing beaches and they are occasionally met with far out to sea. Generation after generation will be born about the same cove or rocky promontory and none appears to leave though they live to a considerable age. There may be miles of suitable coast for seals without colonies, and then half a dozen will be found close together in a small area. They prefer still water and bays and they ascend rivers to completely fresh water, and even enter the Great Lakes.

96. *Common Seal*

MARKHAM





97. *Lion*

LA TOUR

Flesh-Eating Mammals

THE Mammals grouped under this heading form a natural Order, all the members of which are quite definitely related to one another and all of which are at the present day quite distinct from all other mammals. In actual numbers of living types (*species*) that can be clearly distinguished they stand fourth, being greatly surpassed by the Rodents, the Even-Toed ungulates, and the Bats, but in number of families they stand third, while in variety of form they far surpass even the rodents. Not all of them by any means are exclusively flesh-eaters, and some of them are complete vegetarians. They are, on the whole, the most astonishing collection of mammals, presenting the greatest number of surprises to the nonspecialist, and causing the utmost confusion in the minds of the public.

On preliminary investigation this Order would appear to be very simple since it is clearly divided into seven great

groups all of which are typified by an animal so common that youngsters in the lower school grades either know it or have heard of it, even if they are not at all interested in animal life *per se*. The major divisions are the Cats, the Dogs, the Civets, the Hyaenas, the Raccoons, the Bears, and the Weasels.

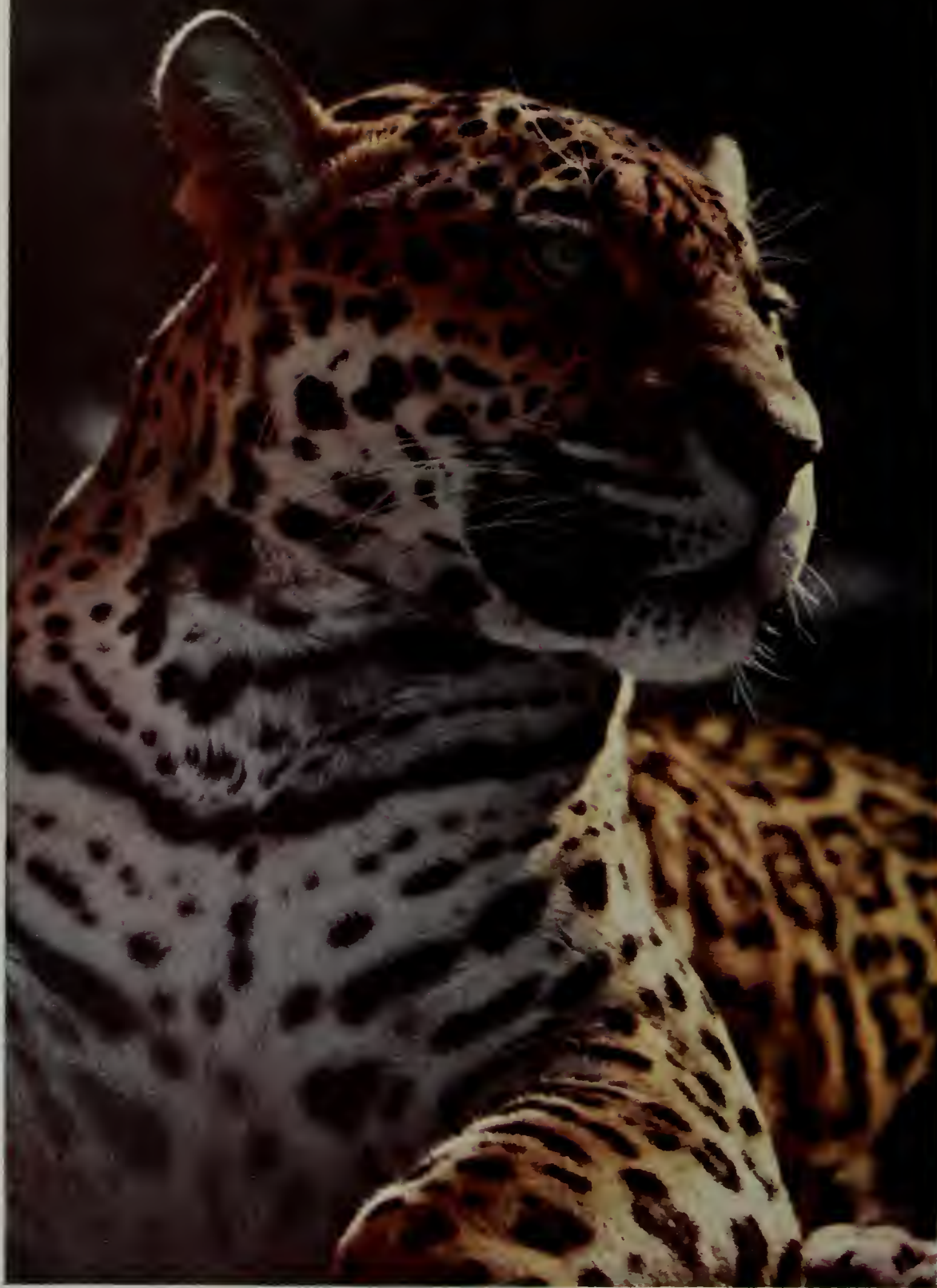
Lions

There are many racial groups of lions (Plate 97) still living today, but individual members of all of them vary a great deal. Full-maned or maneless males of a variety of color combinations crop up everywhere, while their general appearance may change radically with their physical condition and age. Shorn of their manes, they are not the biggest cats, being exceeded by the north Manchurian Tigers. They may be the King of Beasts in appearance, and they are certainly regal in demeanor, but they are terrified of small children, and flapping laundry on a line, and they won't go within twenty feet of a tiny animal called a Zorille. In early historic times lions inhabited Eastern Europe as far north as Roumania and possibly Italy, the whole of the Near East from Turkey to India, Arabia, and the whole of Africa from Gibraltar to the Cape, outside the Equatorial Forests. Today, they are exceedingly rare or extinct in North Africa, gone from Europe, Turkey, Palestine, and Arabia, and are probably now finally extinct in upper and lower Iraq and in Persia. In India, where a British officer once killed four hundred in a few years' hunting in one central area, they are now confined to a few pairs in the so-called forest of Gir in the Gujarat.

98. Leopard

VAN NOSTRAND FROM NATIONAL AUDUBON





99. *Leopard*

VAN NOSTRAND

FROM NATIONAL AUDUBON

100. *Amurian Tiger*

LA TOUR

101. *Indian Tiger*

VAN NOSTRAND

FROM SAN DIEGO ZOO

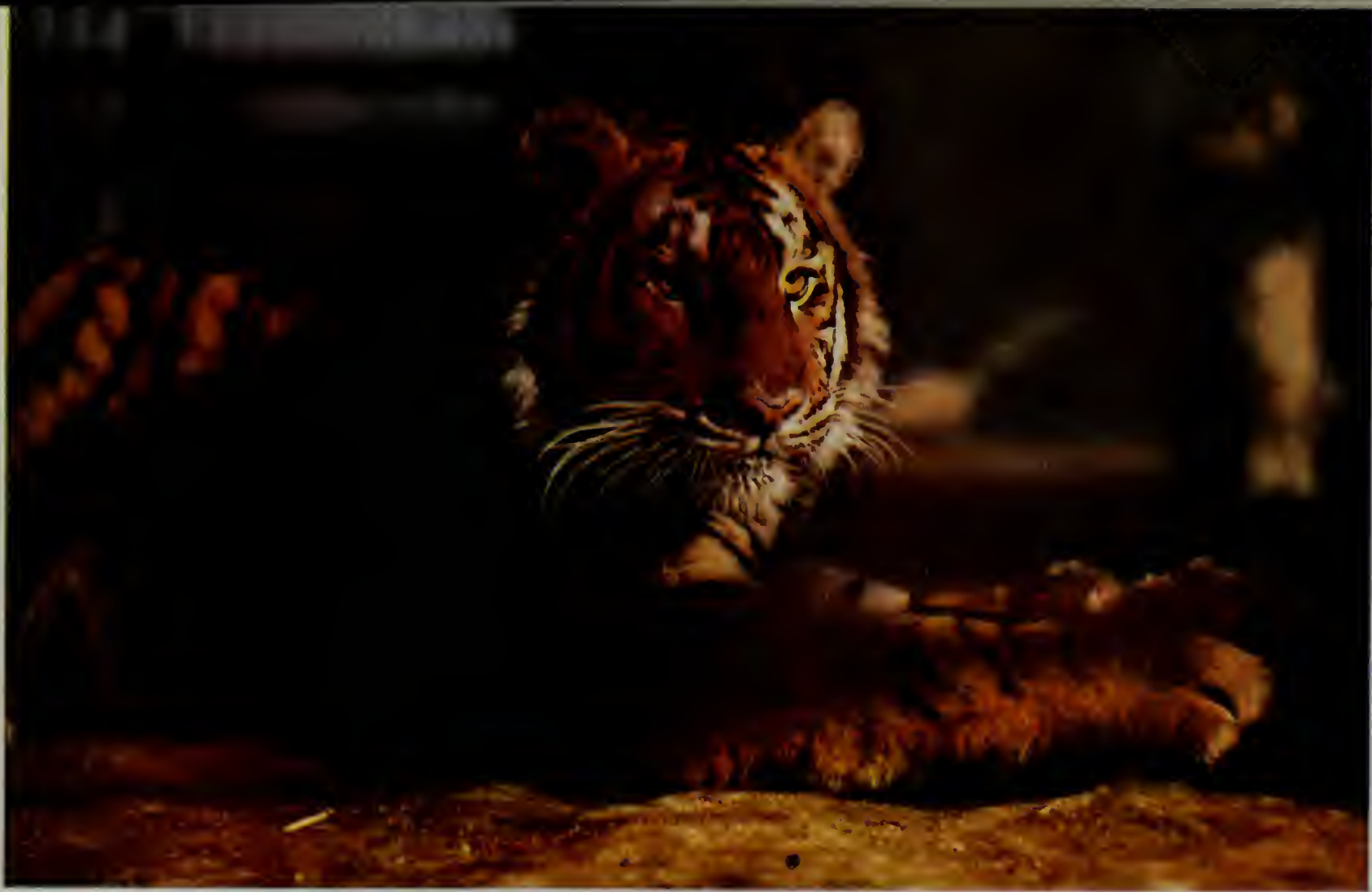
Leopards

Before anything else is said about leopards (Plates 98 and 99), it is essential to dispose of the age-old argument about the names "panther" and "leopard." Fairly important men have been challenged to duels for either affirming or denying that there is a difference —*i.e.*, that there are two different animals. There are not: the two names denote the same animal or animals—for they vary greatly—though they may be used to differentiate between large and small, or between light and dark individuals in any one area.

Despite their wide variation, they would seem to constitute but one widely spread species, all members of which could interbreed, while they have been reported to mate also with

lions and tigers. Nevertheless, leopards from dry, open, rocky or treeless areas tend to be large and pale-colored, while those from damp, forested lowland or mountainous districts are smaller, with a darker basal color and more profuse and larger black spots and rings.

Leopards once ranged from the British Isles to Japan and south throughout the whole of Asia except the uplands of Tibet, including Ceylon and the Indonesian islands. They are now extinct in Europe except in the Caucasus, and they are not found in Siberia or Japan. They are still found all over Africa apart from the true deserts of the Sahara and Kalahari, and are far too prevalent even in the fully cultivated and even the industrialized parts of the Union of South Africa. A desiccated leopard corpse was once found at an elevation of



17,000 feet on Mount Kilimanjaro in East Africa, but what it was doing there, far above the snow line, or what it had fed on, remains a mystery.

Tigers

Although the tiger (Plates 100 and 101) appears externally to be very different from the lion, it is extremely difficult to tell them apart if skinned and laid side by side. Further, they will interbreed, producing "Ligers" or "Tigons," according to which is the father. There are lions without manes and tigers with them, but despite their close similarity in so many respects, they are very different animals. The tiger was originally a northern and probably an Arctic animal and appears to have originated in what is now eastern Siberia, whence it spread south and west in two separate emigrations. The first entered Manchuria, spread to Amuria, Korea, China and then to Burma and India on the one hand, and via Indo-China and Malaya to Sumatra, Java, and Bali on the other. It has never reached either Ceylon or Borneo. The second

stream passed north of the great central-desert belt of Asia, west of Mongolia and Sinkiang to the Kirghiz, Afghanistan, Persia and the Caucasus, in all of which areas it is still found. The largest tigers, with a thick undercoat and very long, pale overfur, come from the colder areas of Siberia ranging from the Altai right across to the Stanovoi Mountains. Despite the fact that tigers inhabit the true jungles of the south which are comparatively cool, they still suffer miserably from the heat, and whenever possible make a practice of bathing and swimming to cool off. They vary much in ground color from bright reddish-orange to almost white, and the black stripes are always unlike on the two sides. Albinos are fairly common and there are all manner of semialbinos, a pure black-and-white female having been killed in Orissa. Very large males of just over ten feet have been recorded. There are usually four or five cubs in the womb, but seldom more than two survive and the parents may eat the rest.

Tigers are great travelers, especially in cold weather when they are much more active, and they usually follow paths for,



103. *Six-month-old
Jaguar Cub*

VAN NOSTRAND
FROM NATIONAL AUDUBON



← 102. *Arabian Sand Cat*

MARKHAM

despite their delight in bathing, they abhor dew wetting their fur. They hunt by ear, have a bad sense of smell, and very poor vision, apparently being unable to differentiate game from the bush as long as the quarry stands still. Unlike the lion, they do not kill with a swipe of the paw, but leap and hug the victim, and then bite its throat. They drag their kills to hiding places and rest up near them till they have finished eating them, even if quite rotten. They will eat 200 pounds of beef at a session and drink enormous amounts of water. When hunting, they make a strange noise like a bell, called "titting."

The Jaguar

The great spotted cat of the New World (Plate 103) is differently constructed, being shorter limbed, broader chested, and heavier in general build. There is much debate as to the size this species attains, but many published accounts to the contrary, it does not appear ever to reach the dimensions of a tiger, though it may weigh as much. Although a quiet and retiring beast, the Jaguar is much more likely to give battle if interfered with, and it can be a rather persistent adversary, making false disappearances, lying in ambush, and stalking even armed men for long periods. The traditional way to tell a jaguar from a leopard depends on no more than a cursory inspection of the pelt, that of the Jaguar having the spots arranged in rings and in more or less horizontally parallel lines on either flank while each ring contains either a single or a small bunch of spots. This holds even when the jaguar is a pure albino, a not uncommon mutation especially in the Guiana Massif, since the dotted rosettes can still be discerned

in certain lights. The Jaguar is the best tree-climber of the Great Cats, and in some areas, when the forest floor is flooded for months on end, it is almost wholly arboreal. However, it also lives out on treeless prairies, scrublands, on semideserts, as in southern Argentina and the southwest of the United States, and in rocky mountains where there is no water. In the Amazonian area it is almost as aquaceous as the tiger. The species is found from California, Arizona, and New Mexico in the north, to lower Patagonia and almost everywhere throughout the intervening territory. Throughout this area it is quite inaccurately, most misleadingly but almost aggressively called the "Tiger" or "El Tigre" by everybody.

Pumas

Some overenthusiastic college students, prosecuting field studies on this animal for their theses, once solemnly described more than a hundred species of Pumas (Plate 105). These cats have also been called Cougars, Mountain Lions, or Catamounts, and by a variety of Spanish names including "Lion," at one time or another and in various countries throughout their vast range from Alaska to Tierra del Fuego and from the west to east coasts of both North and South America. Today, they are restricted to the western third of North America—unless the vague reports that from time to time come in of specimens killed in Nova Scotia and the Adirondacks are valid. There are, however, a few left in Florida. In Central and South America they are still extremely numerous and are found in almost every type of country from bleak mountaintops to steaming, flooded, equatorial forests, open



pine ridges, tangled mangroves, open savannahs, and the pampas. Nonetheless, all these animals are of but a single species.

The Puma is the greatest coward of all the great or not so great cats. Despite voluminous fictional tales and innumerable accounts published as fact, the number of authenticated cases of deliberate attacks upon humans by these animals is so paltry as to be almost nonexistent and most of these are open to some doubt. The animal is a retiring beast and a small-mammal- and bird-hunter, though it will run down bigger game and kill stock if available, and especially when young and unprotected. Nonetheless, systematic slaughter of these animals is not warranted, and stock raisers can fairly easily eliminate confirmed marauders. The Puma is not as great a wanderer as the Jaguar; it normally stays within a limited home range where game is sufficient to support its family, but individuals have turned up in most unexpected places. In South America these cats vary enormously in habit and habitat, but they seem to prefer open country to the closed-canopy forests, and they are commonest in drier, mountainous areas.

Desert Cats

East of the Carpathians and the Caucasus, and extending throughout the desert, treeless, and other drier parts of Asia, including Persia and northern India, there are a number of pale-colored, long-furred, rather flat-headed cats. In Arabia, southern Palestine and across north Africa to Algiers; apparently all over the Sahara to the region of Timbuctoo and the eastern Sudan; and, in the other direction, northeast to the Transcaspian area of south Russia, there is to be found a very distinct small feline known as the Sand Cat (*F. margarita*) (Plate 102). This has a very flat head with ears sticking out on either side horizontally, and carries its body low to the ground. Recent observations have shown that it is a truly desert animal living in holes and being entirely nocturnal. It is a pale, sandy-cream in color with just a suggestion of tabbylike markings on the limbs and tail tip.

Caracals

Throughout Africa in the drier and more wholly desert areas, and in parts of India there is found this altogether different animal. It is slender, with a short sleek reddish-brown coat, and exceptionally long ears ending in long dark plumes that may curve over like tassels. The ears are white inside and black out, and the tail has a black tip. It used to be a common pet in wealthy Indian households and was trained to hunt. It is amazingly agile, can run down gazelle and catch birds on the wing by leaping into the air and striking them (Plate 107).

Bobcats

The name Bobcat is American and belongs to the group of short-haired lynxes found throughout the United States and northern Mexico (Plates 104 and 106). The general appear-



104. *Bobcat*

105. *Puma*

LA TOUR

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106. *Bobcat Kitten*

HARRISON FROM NATIONAL AUDUBON

107. *Caracal*

MARKHAM



ance and habits of the Bobcats are too well known to require any comment except for a word of caution: they vary enormously from place to place, since they may inhabit almost any type of country from bare hills to subtropical swamps, and they will eat almost anything alive. Curiously, Bobcats will also endeavor to mate with domestic cats especially if housed together in captivity, but the kittens very rarely if ever survive. All types of lynxes have been tamed but if not taken when very young are exceptionally aggressive and dangerous, being very agile and usually going straight for the eyes of their opponent. Unlike other cats they may attack humans on sight and will single out persons who have molested them.

Cheetahs

The Cheetahs, of which there are two and possibly three forms, are common to Africa (Plate 108) south of the Sahara, and to India, but they used to be numerous throughout Syria, Mesopotamia, Persia, and the lowlands all around the Caspian. They are plains and desert dwellers, preferring low hilly country. Cheetahs are not true cats despite their leopardine appearance. Their claws are like those of dogs and are not retractile like those of cats. They are one of, if not the swiftest of the animals that go on all four legs, and can run down Blackbuck and gazelles, a feat of which no dog or other animal is capable. Cheetahs have been clocked at over 60 m.p.h. and there are claims that they have hit 75 m.p.h. For this reason and because of their beauty and their unexpected tamability, they have been semidomesticated for centuries in India and in even earlier times in other countries of Asia and in Egypt. The animals are caught wild and when full-grown, and take about six months to train; they then become completely docile although regularly fed fresh blood from the catches they make. They are kept chained, not caged, and are hooded before being taken out to hunt, the hood being removed when game is in sight. The animals then either dash straight at the quarry or stalk it belly to ground until within about a hundred yards when they rush out and run the animal down, knocking it off its feet with a swipe of a forepaw and then seizing it by the throat with their teeth and pulling it down. They then wait till their owners come up and kill the beast.

Indian Gray Mongoose

This is one of the most puzzling and, to the nonspecialist, muddling of all mammalian groups. Almost everybody in the English-speaking world has heard of the mongoose, made famous by Rudyard Kipling as Rikki-tikki-tavi, and everyone knows that "it kills snakes." Unfortunately, there is no such thing as "The Mongoose," there being about a hundred animals that may lay claim to this title. In India there is a species (Plate 109) with white speckles all over the fur and reddish legs, another with yellowish stripes on its neck and a black tail tip, and still others that are distinct though differing in details of appearance only.



108. *African Cheetah*

COMMANDER GATTI AFRICAN EXPEDITIONS

09. *Indian Gray
Mongoose*

MARKHAM





110. *Spotted Hyaena*

YLLA FROM RAPHO-GUILLUMETTE

Spotted Hyaenas

There is a widely held belief that Hyaenas either change sex or are all hermaphrodites. This has come about through the virtual impossibility of defining the sex without dissection, something that is by no means unique among mammals and is often a puzzle with quite common creatures. It is of course untrue. Similarly strange is the appearance of the twin pups of the Spotted Hyaena, which are jet black and take an excessively long time to wean.

Relatively, they are terrifyingly powerful brutes, with jaws, teeth, and muscles to work these with, that put the largest cats to shame. They can crack an ox leg-bone as we do a match, and they completely demolish the largest bones of hippo and even elephant. They are singularly unpleasant beasts of cowardly disposition but dangerously bold and sneaky. They will attack lone men, anything injured, carry off children or any smaller animal, domestic or otherwise, if left

111. *Coyote*

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unprotected, yet a dying man only has to say "boo" to a gang of them and they will flee. Unlike the Striped Hyaena they travel in large packs and they eat on the spot rather than drag provisions to their lairs. They stink and are genuinely dirty, a most unusual thing in Nature, yet the author can attest to the really cleanly and attractive qualities of pups raised from shortly after weaning. Despite their enormous strength, they make docile and apparently trustworthy pets. They are noisy creatures, however, and give out with the most bloodcurdling howls, growls, and barks often ending in an insane laugh. Like all Hyaenas they appear to be lumbering brutes but they can cover rough ground at an astonishing speed, and lope along on flat terrain far faster than a horse.

Wolves, Coyotes, and the Dingo

Many scientists have tried to separate the American, Japanese, European (Plate 114), and other Asiatic wolves but it seems that the same variations and mutations occur in all of





112. *Dingo*

AUSTRALIAN INFORMATION BUREAU

them. The Indian Wolf (*Canis pallipes*) certainly appears very different but there are intermediate races in Afghanistan and other areas where the ranges of the two meet or once must have met. The Coyote (*Canis latrans*) really is different (Plate 111) and, be it noted, has a range overlapping that of the wolf. There are innumerable recognizable races of the wolf, and white, black, grey, brown, red, and yellow individuals are often mixed together. Apart from the Coyote, which is an animal of the open prairies, wolves live in almost every type of country from the bleak tundras to stony mountaintops, baking deserts, forests of all kinds and even equatorial jungles. They are predators and scavengers and are not nearly so dangerous to man or domestic beasts as is popularly supposed. Actually they are shy, retiring animals.

The only True Canine that is not a wolf is the Dingo of Australia (Plate 112). This is probably just an ancient breed of Domestic Dog, taken to that country in boats by either the original or later human immigrants. However, this sleek, yellow animal is undoubtedly an ancient breed and might be somewhat close to the basic stock from which our other tame stocks were originated. Today it is a truly wild animal though the Australian aborigines catch the pups and tame

them for hunting. The animal is very odd in appearance and habits and not only in that it lives in Australia and is the only large nonmarsupial mammal in that country.

Wolves were once found all over Europe, Asia, and North America but man has driven them north to the boreal forests and the Arctic—except in Asia, where the wolves of India have not been so affected. There are really only three, and possibly no more than two, “species” (in the wider sense) of Wolves—namely, the Wolf and the Coyote. There is no real “Wild Dog” known, the animals so called in eastern Asia being entirely different creatures (of the genus *Cuon*), usually called Dholes. Thus, we come to a very strange impasse; to wit, are all domestic dogs merely altered forms of the wolf, or are they the descendants of some animal that is now totally extinct? If the latter, where are the fossilized bones of that animal? A third alternative is that our domestic dogs may have been developed from different strains of wolves, jackals, and other extinct animals at different times and in different places. Whatever the truth, we are nonetheless confronted with the bizarre fact that there probably is no such thing as a “dog” (in the strict sense) and never has been!

It would be purposeless to attempt a description of all



113. *Colombian Bushdogs*

PINNEY

114. *European Wolf*

MARKHAM





115. *North American Red Fox*

CHACE FROM OPL

kinds of Wolves and Dogs since this would entail endless technical minutiae. Besides, almost everybody knows what a wolf, as well as a dog, looks like. There is, however, a very great deal of misconception about the habits of all these animals. These, of course, vary greatly from place to place but also, it now appears, from time to time. Wolves are far less conservative than most other mammals and they are highly adaptive.

Bush-Dogs

Around the fringes of the open savannahs that occur throughout the great Amazonian forest area of South America, there dwell the funniest-looking little doggy animals,

→
116. *Grey Fox*

PORTER

shaped like fat Dachshunds but with slightly bushy tails (Plate 113). They have small, rounded, furry ears, are clothed in coarse sparse hair and make the oddest chirruping, clicking, and whistling sounds. They dig and live in burrows and forage at dawn and dusk, mumbling to themselves all the time. They are carnivorous and appear to be rather intelligent little animals. Most of them are reddish-brown but some have shoulder capes of light yellow and others are black below and all over the flanks.

Foxes

Foxes are extremely numerous and widespread animals. There are about a dozen species, one of which, the Common



117. *Fennec*

MARKHAM



or Red Fox (Plate 115), is found all over North America south to Mexico, in Iceland, in Eurasia north of and including the Himalayas, and throughout Africa north of the Sahara. This animal comes in an extraordinary variety of sizes, some races being twice as large as the smallest; they also vary from bright brick-red to orange, yellow, and all shades of brown, and the Cross, Silver, and Black Foxes are only mutations of this species. The back of their ears and lower limbs are usually darker, and the tail tip may be white or black. The fox is a burrowing animal and not nearly as smart as tradition would lead us to believe. It kills game of all kinds but does a great deal more good than harm by controlling rodent pests. It inhabits all kinds of country but is not a true forest animal. More has probably been written about the fox throughout the ages than about any other wild animal, but a very large percentage of all this verbiage is purely fabulous. On the other hand these animals do many of the most extraordinary things attributed to them, such as de-fleaing themselves by backing under water.

The Grey Fox

This is a very common animal (Plate 116) throughout the United States and Central America, ranging to the northern part of South America, but is seldom seen. It stands more erect than other foxes, has a slightly elliptical pupil, and is a facile tree climber. It inhabits a niche that is subtly different from that occupied by the Red Fox, and before the clearing

of the continent for the European type of farming, it probably lived—as it does in Central America today—only on what is called the “Pine Barrens” or “Pine Ridges” and on other savannahlike tracts. Wherever the southern pines occur, as far south as Venezuela, there the Grey Fox will be. In many areas they run in packs and chase squirrels up trees. They have now taken to infesting agricultural land and they even make their lairs under buildings.

Fennecs

These are probably the “cutest” animals to be found, looking like tiny, fluffy, toy foxes and being unique in that they always look like baby animals (Plate 117). They are nocturnal and range in color from pure white, but for the black nose and huge dark eyes, to various pale cream-yellows washed with rusty brown on the back. Fennecs are true desert animals and spend much of their time underground to avoid the heat of day and the cold of night. They are communal animals and their holes are often linked together. They sometimes congregate in large numbers at the scarce waterholes. They are found all over North Africa and the Saharan region to the eastern Sudan and in Palestine and Arabia. To add to their charm, these little creatures make pathetic whimpering noises when alarmed.

Brown Bears

These would much better be called “Dish-faced Bears” because they range in color from almost pure white to jet black,



118. *American Black Bears*

GARST



119. *Himalayan Bear*

VAN NOSTRAND FROM SAN DIEGO ZOO



120. *Polar Bear*

LA TOUR

and may show almost any intermediate color in the browns, be grizzled, or even particolored. Just to make matters more confusing, the American Black Bear may be brown. They are the bears of Europe and Asia, north of the Himalayas—though there are species *in* that mountain complex—and the northwest part of North America. There are numerous races, and some of these may perhaps be called true species, but they all vary in appearance and habits in the most confusing manner.

There are huge races in Eastern Siberia and in Kamchatka, and there is another readily recognizable race from Syria (Plate 121). In Europe, where they were once widespread, bears are today found only in the Pyrenees, Scandinavian, the Carpathian and Caucasus Mountains and in some limited areas in the Alps. They are still fairly common in Russia and adjacent countries right down to the foothills of the Himalayas.

American Black Bear

The small, common bear of North America (Plate 118) can only be distinguished from the Brown Bears by the shape of

the head seen in profile: the upper line of the muzzle arches slightly upwards; that of the Brown Bears downwards. As stated, it may be various shades of brown, and black and brown individuals may be twins. There are areas where its range overlaps that of Brown Bears, and there are races of *black* Brown Bears. These animals are forest dwellers but they have adapted themselves rather well to the invasion of their territory by civilized man and, after a serious decline in their overall numbers, they made a remarkable recovery in certain localities and now appear to be more than holding their own all down the eastern mountains from Maine to Florida. They are medium-sized animals with comparatively short claws—the Brown Bears are distinguished by having, among other characteristics, enormous claws, sometimes over half the length of the sole of the foot. Large adult Black Bears have been recorded as weighing as much as five hundred pounds.

Moon Bears

South of the range of the Brown Bears in Asia but north of that of the Sun Bear, and spread along a belt of territory

from the borders of Persia to Assam and on to China, Japan, Formosa and Hainan, there are to be found a number of races of large black bears (Plate 119) with a white mark on their chests shaped like a very widely opened "V." Their upper lip is often white and their claws, which are rather small, are black in color. Although seldom growing much more than five and a half feet long, they are of very great comparative weight and become grossly fat in the autumn. They have rather large ears low down on the sides of their heads, and they are forest dwellers, except about the desert area stretching between Persia and Pakistan, where they live among rocks and scrub. They are more essentially vegetarian than other bears, but will gobble up vast quantities of insects and honey, and occasionally take to killing domestic animals.

Polar Bears

This is one of the best known of animals (Plate 120) and is really, in many respects, different from all other bears. Its bodily proportions, with small head and narrow forequarters, and its habits are ursinely unique. It is found all about the Arctic Ocean and upon its ice-raft, and it is an extremely dangerous animal. Its principal food is seals though it is just as omnivorous as it can be and eats much seaweed and terrestrial vegetable matter in the summer, when it may roam quite far inland. It appears not only to regard anything alive that invades its icy domain as appropriate game but also to resent interference on the part of men in particular. Polar Bears will stalk people among the broken surfaces of ice floes with remarkable persistence. In the water, they are, of course,

121. *Syrian Brown Bear*

MARKHAM





122. *North American Cacomixtle*

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deadly, and they have attacked small boats. There is still much debate as to whether these animals hibernate below the ice or migrate in winter. Strangely, they are known to do both.

North American Raccoon

The Common North American Raccoon (Plate 123) is almost too well known and is certainly well enough illustrated herein to obviate the necessity of a description. It is a remarkable form of wildlife that has managed to survive the impact of modern man and is rapidly showing signs of becoming a truly domesticated animal in the United States. Despite gross and quite unwarranted persecution it is thriving in the most highly industrialized areas of our country and has even become a nuisance on the island of Manhattan which it invades via the few bridges leading from the mainland, intent upon the contents of garbage cans. If taken young, "coons" may be readily tamed but about half of them remain unpredictable. They do molest small farm stock and poultry and transmit sundry diseases but they are otherwise innocuous. Though slow and deliberate, they display many qualities of dogs, and they are vastly more competent than those animals at looking after themselves, for they climb, swim very well, and use their hands with almost as much dexterity as monkeys.

These animals are in many respects equivalent to that competent living fossil, the Common North American Opossum, in that they can subsist on almost anything, hide from anything, and defend themselves from most predators, while they are themselves predaceous, aggressive, and tough. They also breed very regularly and strongly. A very large and interesting book could be written about the Raccoon and, with

123. *Common Raccoon*

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its industrious energy and resourcefulness, it deserves to be elevated to the status of the National Emblem in place of the parasitical, carrion-feeding Bald Eagle. Nevertheless, these animals are ingenious and persistent rather than truly intelligent and survive more by giving ground than by aggression. It comes as a surprise to many to know that in the South and in the tropics they are one of the most vociferous of all night animals and in the mating seasons they give out with screams, as well as mewing, growling, and whistling.

Cacomixtles

Going down the scale, we come next to some strange alert little animals that are in many respects raccoonlike but are apparently very primitive and ancient types. They have squirrel-shaped bodies and immense bushy tails, vividly ringed with black and white. The so-called "Ring-tailed Cat" (Plate 122) of the southwestern half of the United States (from Oregon to Alabama and south to Mexico) is really a very common animal but seldom seen on account of its nocturnal habits and extraordinary nimbleness. Further, it can squeeze into slits between rocks or cracks in trees, sometimes hardly two inches wide, that one would suppose a good-sized beetle could not enter. The bodies of these animals are clothed in very soft, dense fur of a gingery brown color. To the south, in the forests of Central America, there are other larger species, silvery grey in color. All have foxy faces and pronounced black and white facial markings. They are arboreal animals but in the Rockies they often live in open desert country among boulders and in Mexico City they infest houses and parks. They are the all-time escape artists, can open any device but padlocks, and can squirm through the minutest cracks and crannies.

The Lesser Panda

This delightful little animal, looking rather like an animated toy especially when it trundles along on its somewhat pigeon-toed, bearlike feet, is nonetheless not recommended as a house pet. It may be tamed to take food from the hand and even climb to one's lap but its claws have cutting edges like razors, and it cannot bear to be touched. It can move with lightning speed and give a terrible bite. It comes from the Himalayas west of Nepal to Yunnan and Szechwan in China and south at least to Laos, but always in the mountains ranging from the 6000- to 12,000-foot levels. It is an arboreal animal and usually lives in holes in trees but spends much time on the ground foraging. The parents live together at all times and are usually followed by a line of young ones often of various sizes (Plate 125).

The affinities of these Asiatic animals is most puzzling to all except Americans, who, even if not specifically interested in natural history, almost invariably spot Lesser Pandas as kind of 'coons. Even zoologists for a time considered the



Giant Panda to be a strange kind of bear. The latter is wholly and the former almost wholly vegetarian and both have specialized in bamboo-eating.

Weasels

There are a seemingly endless number of weasels, most of them belonging to a great genus named *Mustela*, which is often made to embrace the Polecats and the Mink. However, both these are every bit as distinct from the little, long-bodied True Weasels as are the Martens, Tayras, Grisons, Striped Weasels, and Zorilles. With the exception of the Zorilles, all these animals are elongated and short-legged. They are predators par excellence, usually entirely carnivorous but may, in some cases, take carrion.

One simply cannot give any adequate description of this great host of little, seldom seen animals within the present compass. Apart from the Stoat of Europe, and some other northern forms which turn pure white in winter, and are then known as Ermines, they are all very much alike in form and even in coloration (Plate 129), being sleek-furred, and usually some reddish-brown color above, and white below. They range in size from less than six inches to almost two feet, and many of the larger ones tend to have a dark mask and other light and dark facial markings. Weasels are found from the barren ground north of the Greenland Icecap throughout the Americas to Patagonia where there is a very odd type (*Lyncodon*). They appear to be absent from the Amazon Basin,

though this is not a certainty. In the Old World they range from the Arctic seashores throughout Europe and Asia south to and including the Himalayas, Assam, and the mountains of inner Burma. They are not known in the lowlands of India, Indochina, or China. They are enormously strong and quick little beasts that can sometimes kill animals over a hundred times their size. One species, only a foot long, is trained by the tribesmen of northern Burma to kill large geese and even small goats, which the weasels do by biting through the main arteries in the neck of the unfortunate quarry. They do ghastly damage to domestic animals and especially poultry wherever they appear, and one weasel can just about clean out a henhouse unless it is promptly caught. They will bite and fight anything however large; yet many species, and perhaps all, can be tamed and trained, and often even if wild-caught and adult. Were it not for weasels, rodents might well have defeated man's early attempts at agriculture, and despite their deliberate destruction of game birds' eggs and young, they should be most rigorously protected. Many kinds hunt in small packs, darting about like vast insects, never still, examining every nook and cranny, and ganging up for the kill. There are persistent tales of weasel funerals, when, it is said, dead members of a pack are ceremoniously dragged away by the others. Despite ridicule, several most careful students in Europe have recently stated that they believe this to be true. Most weasels have litters of about five young and sometimes two or three times a year. The babies look like tiny cocktail sausages.

124. *Black-footed Polecat*

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125. *Lesser Panda*

E. P. WALKER

Polecats

Of very similar form to the True Weasels are a number of larger, heavier, slower-moving animals found on the more open plains areas of North America, Europe, and Asia. They are parti-colored, have bodies lighter in color than their tails and limbs, and pronounced dark masks. Their fur also is much longer, having a dense underwool and a rather sparse, long, shiny overcoat. The typical species of Europe is the original and true Polecat (Plate 128), from which the domesticated hunting Ferret was produced, and the fur of which was once well known as "fitch." Ferrets are usually of pure albino stock that breeds true, but they may be colored like the wild animals, while there are also intermediate forms that may or may not breed true. Ferrets are fine ratters and in some places are trained to work with a Falcon to get the pestiferous European Rabbit out of its warrens. From southeast Europe through the Near and Middle East to India and China their place is taken by the Mottled Polecats (*Vormela*), and in

North America by the Black-footed Ferret (Plate 124), which ranges from Montana to Texas and lives principally on Prairie Dogs. Polecats do not hunt in packs and are far less wanton in their killings than weasels. They make the most delightful pets but the females become irascible when pregnant, which is their normal condition throughout the year, unless actually nursing a litter.

Minks

Of slightly shorter and more compact form, and with even thicker and more lustrous fur are the semi-aquatic minks (Plate 126) of Eurasia and North America. They are now apparently extinct in Europe west of the Baltic States, east Poland, and south of the Carpathians. They are still found throughout Finland and in Russia south to the Black Sea and east to the Ural Mountains. Beyond that point their place is taken by another species (*L. sibirica*). The European form is almost identical to the American, though usually having a white throat, chin and upper lip. Various races are recog-

nized on both sides of the Atlantic according to size and shades of color. In America the largest are in the northwest, and the smallest in the northeast, while all those in the north are dark. The farther south one goes the lighter and redder they become, as a general rule. Strangely, the fur of the mink was regarded as hardly worth a trapper's effort to collect until this century; now it is more prized than anything but the true Sable, and millions are raised in captivity, while a great variety of new colors have been produced in this caged stock.

American Badgers

On the great west-central plains of North America from Michigan and Ohio to Saskatchewan and Washington, and thence south to Texas, California and Mexico there still live very considerable numbers of these large, low-chassised animals (Plate 127). Males may measure up to three feet, of which only about six inches is tail. They are very flat, broad animals and are fearfully strong. They have been known to raise a horse and rider standing on a platform. Their principal food used to be the Prairie-Dogs and Pocket-Gophers of the plains, which they dug out of their holes. Today they have taken to living on farmed land and eat not only all animals they can catch but also a considerable amount of vegetable matter if fresh meat is lacking. They have ridiculously

long front claws for digging and can accomplish extraordinary feats of excavation at incredible speed. Their resting and nursing quarters may be thirty feet below the surface. In mid-summer they give birth to about five young at a time. Their skins are exceedingly thick and tough and are about a size and a half too big for their bodies, which aids them in getting through tight corners. And they are really tough animals that can literally take almost any beating. They have a strange habit of going into some form of profound sleep or coma, so that they appear dead and are somewhat rigid. If mistakenly handled when in this state, however, they may suddenly snap out of it fighting and inflict ghastly wounds. They are fearless if cornered and will then stand and fight, pressed to the ground and hissing.

Skunks

The skunks form an exclusively New World and very distinguished little group of animals. Most misleadingly they were dubbed "polecats" by the first English-speaking settlers and this has caused endless confusion. They produce large quantities of highly volatile oil in a pair of pigeon-egg-sized glands under the skin below the tail and on either side of the anus. This liquid, which is pale yellow, may be forcibly squirted at will by the animals to a distance of several feet and

126. *Mink*

MASLOWSKI & GOODPASTER FROM NATIONAL AUDUBON





127. *American Badger*

HARRISON FROM NATIONAL AUDUBON

forms a fine mist. It has a concentrated aromatic odor that is almost universally held to be highly offensive but which tests have shown is almost as universally declared to be rather pleasant when not too concentrated and its true origin is not disclosed. Although most of the horror of these animals is thus demonstrably psychological, the fluid can cause serious or permanent harm to the eyes if received at close range. All skunks appear to know the power of these defensive weapons and they are on the whole loath to use them unless pushed too far. They are also highly self-confident and very indifferent to other animals and people, and they cannot seem to get used to automobiles although they are intelligent and quick to learn. They make very fine pets, but as with all animals, each individual is of a different temperament so that, like men, they range the whole gamut of personality from blithering idiots, to thieves, bruisers, geniuses, and sloths. They may be deodorized when young, but those that have not been operated on make the best pets and seldom "let go" except at bothersome dogs or incredibly stupid people who persist in teasing them. Even then they give fair warning by elevating their

bushy tails and sometimes by tipping forwards onto their front feet and balancing upside-down like acrobats. There are three genera of skunks: one typically South, one Central, and the third North American.

Striped Skunks

This is a somewhat misleading name since the arrangement and extent of the black and white areas of their pelts is subject to the wildest variation even within a single litter. They may range from pure black to pure white, have black or white tails, single or double white stripes, a white cap, or an endless number of other designs. Further, the species inhabiting the Southwest and Mexico, the Hooded Skunks (Plate 131), may have the same color arrangement as the Hog-nosed Skunks. The range of this genus is from Hudson's Bay in the north, to southern Guatemala in Central America. They are exceedingly common in most parts of their range and they are little affected by modern civilization, being at home in suburban areas of the largest cities. They like to nest and spend the winter under buildings. Their oil is a good substitute for "musk"



128. *European Polecat*

YLLA FROM RAPHO-GUILLUMETTE

and "ambergris" as a fixative for perfumes. Up to ten, minute, blind young are born in early May and are nursed for many weeks before being led out in a solemn little procession by the mother on their first foraging expedition. There is only one prettier sight and this is the little communal dance that these animals sometimes put on in the mating season.

Spotted Skunks

Overlapping the range of both the Hog-nosed and Striped species and holding an intermediate geographical position, is a group of smaller and otherwise quite different skunks (Plate 132). They have beautiful silky, as opposed to rather coarse, fur ornamented with a complex arrangement of broken white belts forming a mazelike pattern, and they almost always have pure white tails. They are much more sprightly than their larger cousins, and are more prone to perform acrobatics on their front feet, running along with bodies perfectly balanced upside-down. Spotted skunks range from a line drawn across North America from Puget Sound in the west, to Maryland in the east, and thence south to Panama. They too dwell in all kinds of territory, but in the tropics are more often found in real forests than are either of the others. They can also climb, and the author was once greatly

surprised to see a mother and three young emerge from a hole in a tree thirty feet from the ground and go off through the branches just like arboreal animals. They are often abroad by day.

Common Otters

The Otters form a very compact group of animals spread all over the world except for Australia. There are endless described species, but all are much alike so that only five may be separated as distinct genera, and these on slim grounds in three cases. Two are very strange indeed, and one of these, the Sea Otter, may well form a distinct subfamily of its own.

The most puzzling aspect of the Otters is perhaps that we do not really know how many different kinds there are nor the limits of the ranges of those that we do know. The Common Otter of Europe (Plate 130) with variations appears to range all over that continent up to the Arctic Circle, and thence right across Eurasia north of the Himalayan massif to Amuria and also through Mesopotamia and Persia to India south thereof. The Common Otter of India is smaller and greyer in color and ranges on into Burma. In India, however, is another species called the Smooth Otter—a really silly



129. *European Weasel*

MARKHAM

title—which extends east to Malaya, where it is domesticated for fishing. Then there is a very large species with a hairy nose found in Malaya and on Sumatra. Common Otters, *per se*, are not found in Africa, but a species or group of closely related species range from subarctic Canada to the Argentine in the New World. Just how many kinds there are in South America is not known at all, but there are at least two in the Amazon Basin. There is a distinct small form in Central America and west of the Andes south to Ecuador; and there is a very special small, pale-colored species in southern Chile which is as at home in the sea as in fresh water. In Asia, Africa, and South America there are other otters of still other genera.

The habits of otters are, as it were, obvious and have been widely publicized in many movies, yet there are curious aspects of their behavior that are not so widely known. Otters prefer to be in water, and although sometimes making long treks across waterless country, always dash for water when alarmed. They are not entirely nocturnal and some races fish by day and night. They can stay underwater for long periods

and when they come up for air just protrude the nostrils and then dive again, letting out a little line of bubbles. The power of otters is not appreciated. If one of these animals can get its nose between any two movable objects, up to positively vast sizes and weights, it can pry them apart. Even welded wire can be opened up if the spaces are large enough for the insertion of their flattened, sharklike snouts. Otters are not exclusively fish-eaters: on the contrary, they eat more crayfish, snails, frogs, young water birds, water rats and suchlike than fish. They are almost as impervious to cold as are seals, and provided there is water available, they frolic about in snow and ice at the lowest temperatures. They are, it seems, truly playful creatures, so that their mud- and snow-slides are used by them much as similar devices in playgrounds are by human children, though there may be deeper reasons for this singular behavior. Otters make remarkable pets and a whole volume could be devoted to their habits under artificial as well as natural conditions. Nonetheless, they are dangerous animals, and for all their playful antics, can give terrible bites.

130. *European Common Otter*

LA TOUR





131. *Hooded Skunk*

L. W. WALKER FROM DESERT MUSEUM

132. *Spotted Skunk*

HARRISON FROM NATIONAL AUDUBON



Whales

WHALES are the most exotic and one of the most widely known, by name, of all groups of mammals but are probably the least understood. A great deal that has been published about them even in scientific literature is pure make-believe, while popular literature anent these animals is often completely inaccurate. Only in this century have new and often most tedious methods of investigation begun to bring to light some true facts about these mammals and their habits. The commonly accepted story of the whaling industry is in an even more deplorable condition but more through incorrect emphasis than for lack of accurate records. Man has been hunting whales on the high seas for at least ten thousand years and among mammalian products those derived from whales stand second in importance only to those derived from domestic mammals.

There are about a hundred known species of whales divided very clearly into two groups known to science as the *Mysticeti* and the *Odontoceti* and in popular parlance as the Baleen or Whalebone Whales, and the Toothed Whales respectively.

There are six distinct families of Toothed Whales and it is not at all certain that they all belong to the same branch of the family tree since they are all so unlike. Their habits are equally various, and they range in size from the mighty Sperm to the tiniest living whale, which is only just over four feet in length when fully adult. One Toothed Whale has no teeth at all, several have only two, others have them either in their upper or lower jaws alone, while many have more teeth than any other mammal. This multiplication of teeth from the basic set for mammals of forty-four appears to have been evolved through the division of the actual teeth into three parts or more.

Dolphins

This is by far the largest family of whales and contains animals of very widely differing appearance, size, and habits. It can be divided into three parts, the first containing four most singular large animals; the second, the main body of closely related true Dolphins; and the third group consisting of odd, rather primitive forms that inhabit tropical coasts and rivers. The animals of this family have no common overall characteristics by which the nonspecialist may recognize them.

There are five genera of beaked dolphins recognized, only one of which will be dealt with here, the best known or Common Dolphin (*Delphinus*) (Plates 133 and 134), of which there are many species distributed all over the tropical and



133. *Common Dolphin*

WILLINGER FROM SHOSTAL

temperate seas of the world. They have been known since time immemorial and have played a large part in the folklore of many lands, notably classical Greece and Rome. Much nonsense has been written about them, including the solemn statement that they like music, especially that made by a "water organ." Nevertheless, several of the most outlandish of these claims now appear to be perfectly true, but some of the currently believed "facts" about these animals are pure bunkum. For instance, dolphins will come to a boat on which loud music is being played on a still sea and they can be attracted by knocking on the hull with a hammer. For some extraordinary reason they can and have been tamed and notably by young boys: there are photographic records of this. They do appear to try to aid wounded members of the school by pushing them up for air. On the other hand, the new and now very widespread practice of calling them "porpoises" is not only wholly inaccurate but ridiculous. The name "dolphin," for these animals, is thousands of years old, whereas porpoises are quite other animals of another family. The animals that are often depicted jumping through hoops for fish in Floridian aquaria are Dolphins, *not* Porpoises.

134. *Common Dolphins under water*

WILLINGER FROM SHOSTAL



Odd-toed Hoofed Mammals

EVEN those of us born in cities come to understand, as soon as we can name any animals, that dogs and cats belong together; that rats, mice, rabbits and guinea-pigs are somehow associated; and that monkeys are classed with apes and ourselves. For some remarkable reason, the average youngster will also instinctively group horses, donkeys, pigs, deer, and even elephants and rhinoceroses, together, though nobody appears to be able to state exactly just why this should be. Early classifiers of the mammals did likewise and both now appear to have some solid grounds for doing so. Moreover, there is an actual relationship between these animals.

However, the hoofed mammals may be clearly divided into two great groups, known as the Odd-number-of-toes and the Even-number-of-toes Ones. The first group are today few in number but include some well-known animals. In bygone times they were much more numerous and were represented by all manner of strange beasts, some of gigantic size—one, a

form of rhinoceros known as *Baluchitherium*, was the largest land mammal that ever lived, standing well over eighteen feet in height. Today, there are three kinds of hoofed mammals with an odd number of toes, the Horses (including the donkeys and zebras), the Tapirs, and the Rhinoceroses. The Horses stand considerably apart from the other two and, despite their great variation in external coloration, are all very much of a oneness. The Tapirs are split into two parts, for one is found in the Oriental Region and the other in tropical America. Of the so-called Rhinoceroses, there are two quite distinct types: one containing three and possibly four species, the other being really an entirely different kind of animal (the White Rhinoceros of Africa) which should properly be called a Ceratothere.

Horses

Domestic horses have rightly been made the subject of what now almost amounts to a science in itself. From the tiny Shetland Pony to the gargantuan Shire they all appear to have been derived from one, two, or at most three separate wild species. One of these, Przewalski's Wild Horse (Plate 137) is still alive; the others are extinct as wild animals, if they ever existed.

Zebras

The Zebras are one of the most difficult groups of animals to arrange in any understandable order. No two individuals are alike and there is always a very wide range of variation in a herd, in any one locality, and in both subspecies and species as a

135. Zebrorse (Hybrid)

YLLA FROM RAPHO-GUILLETTE





136. *South American Tapir*

LA TOUR

137. *Przewalski's Wild Horse*

MARKHAM





138. *Common Zebra (Bohm's subspecies)*

VAN NOSTRAND FROM NATIONAL AUDUBON

whole. They will also interbreed with horses, producing zeborses (Plate 135) or so-called zebrinnies. Actually there are four types of zebra-striped Equines, one of which is now extinct, and one of which is the quite distinct *Dolichohippus*.

The true, Common, or Burchell's Zebras (Plates 138 and 139) are numerous throughout a very wide range in Africa south of the Sahara. Dozens of different kinds have been described but it appears that all fall into one of four recognizable subspecies.

Grevy's Zebra

This is the most horselike of the striped Equines (Plate 140), and has a very large head and huge ears. It is vividly striped black and white all over except along the mid-belly but the stripes are individually very narrow.

South American Tapirs

As was said above, the Equines stand considerably apart from the other Odd-toed Hoofed Mammals. There is no doubt that the Tapirs and Rhinoceroses had a common origin and there is some evidence that the latter sprang from the former. The tapirs are very basic creatures having remained almost entirely unchanged for an incredible length of time and being, among Ungulates, just about as primitive as any hoofed animal could be. They have been a fairly numerous group over the ages but today there are only four species left, one in Malaya, and three in Central and South America. There appear to be more than one kind—or species—of small tapirs in South America (Plate 136). They have noticeable, erect crests of stiff hairs rising from the crowns of their heads and extending down the neck to the shoulders.

One-horned Rhinoceroses

The Rhinoceroses are somewhat more varied than the Tapirs but are also mere remnants of a past familial glory. Not so long ago, geologically speaking, the earth positively swarmed with rhinocerotine creatures of all sizes; today there are but seven recognizable forms left, as far as we know. These may be clearly separated into four genera—two in Asia and two in Africa. One genus is distinguished by having only one horn on the snout, the others have two, but one of these is really a very distinct animal—the Wide-lipped Rhinoceros of Africa. The first is the so-called Great Indian Rhinoceros (Plate 141), which is now to be found only in certain limited areas of tall reeds in Bengal, Assam, and the river bottoms of eastern Nepal. It is an enormous bumbling beast, clothed in a pachydermatous hide that is covered with bosses and appears to be armor-plated, being thrown into folds with deep pleats running over the shoulders and ringing the limbs. It is a grass- and reed-eater and stays near water in which it bathes daily. It was once distributed much more widely over the moist parts of India but it is obviously marked for extinction, being far too specialized to thrive in a world containing large numbers of men as well as other petty annoyances.

139. *Common Zebra (Grant's subspecies)*

MARKHAM



140. *Grevy's Zebra*

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The African Black Rhinoceros

The Two-horned Rhinoceros of Africa (Plate 143) is a rather smaller animal never reaching the bulk of the Great Indian one-horned animal. Its skin is naked and dark gray, and is not thrown into folds. The head is small, the front horn long, slim, sharply pointed and slightly recurved, the back one is conical and wide-based. The upper lip of this animal comes to a sharp point and hangs down over the lower and is highly mobile. These animals once ranged all over Africa south of the Sahara but outside of the closed-canopy forests. Today they have been exterminated in the south and much of the southeast but are still to be found from the southern limits of the Congo forest area on the west to the central east coast and thence north to Abyssinia and then west again north of the Congo to the western border of the Cameroons about Lake Chad.

Ceratotheres

The other so-called rhinoceros of Africa (Plate 142) is really a very different beast though it also has two horns. Both of these are conical but both point forward at an acute angle and both come to a slightly recurved sharp point. The animal is commonly called in English the "White Rhinoceros." It is not white in color, but pale gray when the skin is dry and seen under a bright sun. The name derives from the Dutch word *weit*, meaning "wide," and originally referred to the wide, almost square upper lip and muzzle of the animal. There are two populations of *Ceratotheres* in Africa, one in the southeast where the animals are now confined to two reservations in Natal, the other spread over a considerable area in a triangle between Uganda, French Equatorial Africa, and the Sudan.





142. *Ceratothere* or *White Rhinoceros*

COMMANDER GATTI AFRICAN EXPEDITIONS

143. *African Black Rhinoceros*

LA TOUR



Even-toed Hoofed Mammals

THE Even-toed Hoofed Mammals are today a very numerous order—in fact the fourth largest, containing no less than a tenth of all genera of living mammals. If the extinct forms known from fossils be included they are second to the Rodents alone, and contain over a seventh of all described kinds of mammals. Although they originated in very early times along with the first Carnivores, they are comparatively modern and the most highly evolved of mammals. They are also extraordinarily varied in size and form, ranging from the tiny rabbit-sized Chevrotains and Pigmy Antelopes to the huge Alaskan Moose and the positively monumental Bactrian Camel. What, moreover, could be more exotic than a Giraffe or more nondescript than a Suni?

Pigs

The normal habit of all these animals is to roam the woodlands rooting into the surface soil for all manner of food from snails and earthworms to roots and fungi. At times they resort to their wallows and take a mud bath. For the rest, they are exceptionally clean and surprisingly devoid of external blemishes. They do, however, customarily harbor sundry internal parasites which readily pass to those animals that eat their flesh. In past centuries they were therefore rightfully excluded from the diet of various peoples by wise legal and religious decree.

Wart Hog

This, the most exaggerated of pigs, is probably the commonest species alive today and is known to anybody who has ever sat through a travelogue or almost any other film made about or in Africa. Of the most repulsive mien, this squat-bodied, half-naked creature with fragile-looking legs and enormous flattened head, from the sides of which grotesque warts protrude, is found all over Africa south of the Sahara and outside the closed-forests, except in the mountains of Abyssinia and in the Kalahari Desert. It is now also eliminated from the enclosed areas of the Union of South Africa and is rare in West Africa except along a narrow belt between the northern edge of the forests proper and the southern edge of the deserts. It lives in large holes which it excavates itself but usually starting with an abandoned Aardvark's or other animal's retreat, and into this it backs when retiring to rest or avoid the heat. Its immense tusks grow outwards, then upwards, and finally inwards over the muz-

zle and are used much as we use a hoe. Wart Hogs put on a great show of courage and may carry through their threats but usually retreat, tails on high, with an air of insolence that is hard to tolerate. When they lose their nerve, which is very often, they also lose their wits and become quite hysterical and often run over each other in their eagerness to decamp. They eat almost anything that comes to hand and have been known to take carrion.

Collared Peccary

Prior to the arrival of Europeans and even more so of the Chinese in the New World there were no indigenous Pigs in that hemisphere. Their place was taken and still to a large extent is occupied by somewhat similar-looking but totally different animals known as Peccaries. We stress the importance of the Chinese in the Americas because it was these people who brought the breed of domesticated true pig that so readily takes to the wilds and has supplied the main stock of the feral so-called "razorbacks" which infest the entire woodland area of southeastern North America, many parts of Central, and even some areas of South America today. The Peccaries, although now exclusively of the New World, were not apparently evolved there, for the fossilized skeletons of creatures that appear to be of this family rather than of true pigs have been found in both Europe and Asia and in very ancient strata. Somehow, however, the remnants of this family became isolated in the warmer belts of the Americas.

The Collared Peccary (Plate 144)—is quite common and widely spread, being found in almost all types of country—from the deepest tropical swamps to barren uplands and the desert scrub all the way from the southwestern United States to the Argentine and occurring also on the island of Trinidad. Their habits are similar to those of the true wild pigs, but they are not so aggressive, seldom if ever actually predaceous, but just as wily. When these animals enter a tract of land, be it forest or desert, they literally plough up its entire surface and eradicate all animal life and most else that is edible. Peccaries have a habit of clapping their jaws together when alarmed or angry and this is a severe warning to stay at a safe distance since they give a fearful bite. They have scimitar-formed tusks in both jaws as well as sharply pointed cheek teeth. Mothers defending their young may also slash with their pointed hoofs. Like the true pigs they appear to be immune to snake-bite and will eat snakes.

Hippopotamuses

The exact position in the scheme of life of these remarkable beasts was for long a puzzle to naturalists and zoologists; though the Romans seem to have correctly placed them alongside the pigs and the perspicacious Greeks called them Libyan (*i.e.*, African) monsters and left their genealogical status in limbo. There are two kinds of hippopotamines alive today, both found only in Africa.



144. *Collared Peccary*

VAN NOSTRAND FROM NATIONAL AUDUBON

145. *Female Wurt Hog*

MARKHAM





146. *Hippopotamus*

VAN NOSTRAND FROM NATIONAL AUDUBON

The greater hippopotamus (Plate 146) is still a rather common animal in most of the great rivers of tropical Africa and may occur in alarming numbers in some limited stretches of quite small streams as well as in isolated lakes and even ponds. It used to inhabit the Nile to its estuary in the Mediterranean, where it was known to the ancients as the "behe-moth" or transliterations thereof—a word that appears to be of Assyrian origin and to mean monster. It is now unknown north of the cataract at Khartoum. Likewise, it was common

in South Africa when the Hollanders first colonized that country but is now unknown south of the Orange River. There are, however, places in central Africa where as many as a hundred may on occasion still be seen at one time.

The bulk of a full-grown male hippopotamus can hardly be believed even when viewed at close range in a zoo. One wonders, when so observing the brute, how on earth its small stumpy legs, for all their girth, can support the body, yet the same beast in its native waters can overtake almost any man-

powered small boat and even motorboats by paddling like a dog with these same ridiculous little limbs. The famous big-game photographer, Martin Johnson, recorded one of them rushing at the boat in which his camera was mounted at such a speed that it rose half out of the water, its navel plainly visible. Though of a mild disposition, the Hippopotamus is a rather fussy animal and adopts a highly proprietary attitude to its own chosen stretch of river. Normally, it moves out of the way of boats and then floats, just below the surface, with its periscope eyes protruding from the surface, observing the intruder, its small ears flickering constantly and vigorously. However, it may for reasons known only to hippopotamuses rush upon a luckless passing craft and either stamp it underwater or chew it up. And the bite of a hippo is a ghastly thing: the author has inspected the remains of a man bitten clean through the torso by one. On land, the animal is equally unpredictable and on occasion highly dangerous. Encountered at night when on its way back to water, it may not only charge but become a positive nuisance and most persistent in gaining the right of way; when on trek from one water system to another, it often enters plantations and gardens and demolishes anything less than a fair-sized tree.

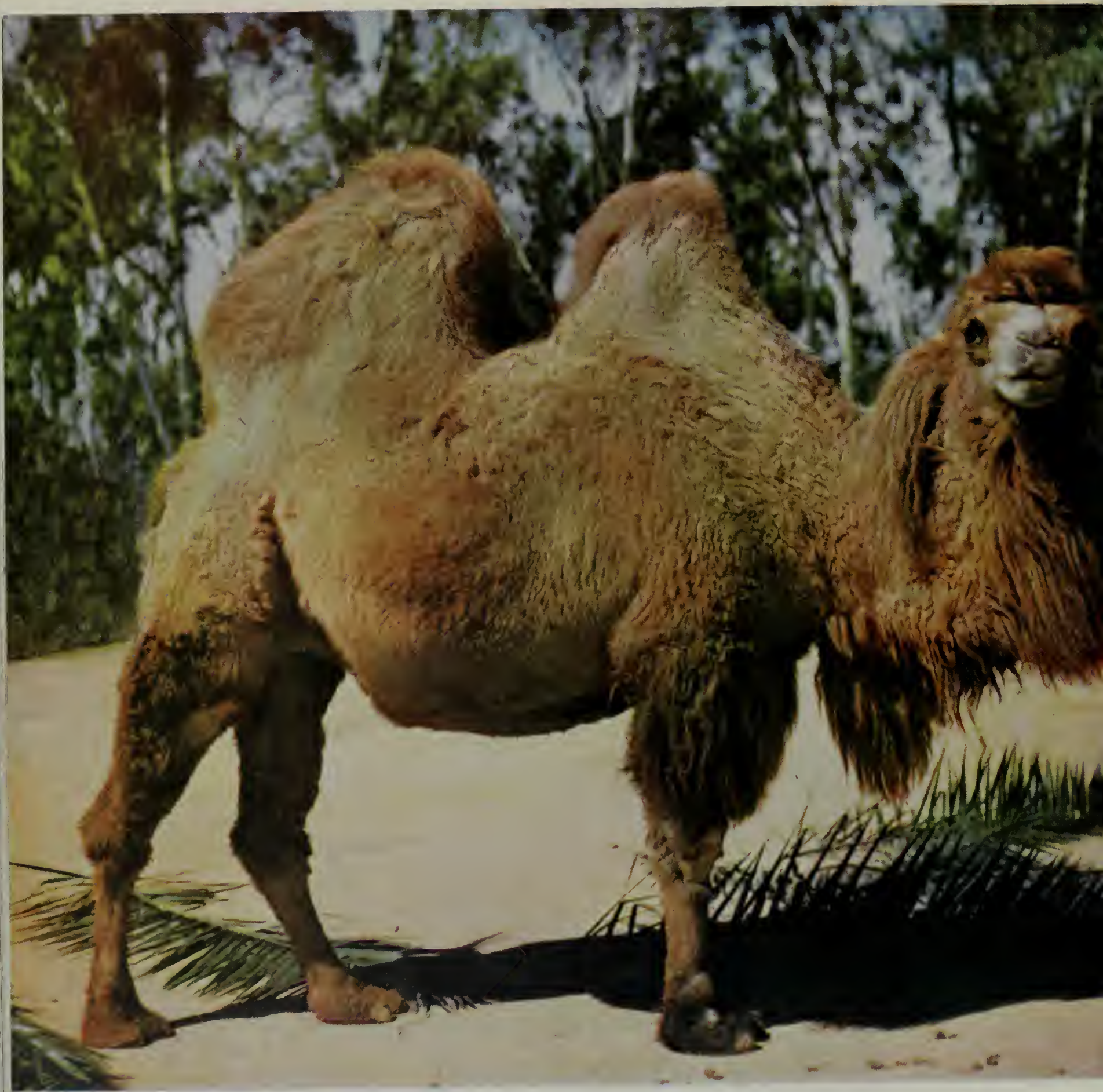
Pigmy Hippopotamus

The more primitive of the two extant species (Plate 147) is the Pigmy Hippopotamus (*Choeropsis liberiensis*) of West Africa, which is the size of a large pig, extremely rotund, and almost wholly aquatic. The head is comparatively small but the wide-gaping mouth is filled—rather erratically, it seems—with fanglike teeth. The animal is of mild disposition and so retiring it was only discovered at the beginning of this century. It inhabits a few lakes and tracts of deep forest where there are small rivers and stagnant pools and ponds, and never ventures far from water. It is a nocturnal feeder and cannot be out of water for any length of time because its moist and thin skin, which is perforated all over with large pores, rapidly dries up and cracks unless kept wet. The author watched a baby of this species weighing sixty-eight pounds actually absorb three and three-quarter gallons of water through its skin in an hour in a carefully controlled experiment conducted in a container of known capacity. Moreover, the animal was not unduly desiccated before being immersed and did not appear to drink any of the water.

147. *Pigmy Hippopotamus*

LA TOUR





148. *Bactrian Camel*

VAN NOSTRAND FROM NATIONAL AUDUBON

Camels

It is not certain whether there are any truly wild Camels left anywhere, though there are still large herds of the two-humped, long-furred species (Plate 148) to be found wandering about on the arid plains of central Asia. These are known to interbreed with animals of the same kind raised under pure domestication and they look in no wise different.

There are only two species of true Camels, one indigenous

to and very numerous throughout Asia north of the Himalayan massif, with long hair and two humps; the other spread all over Africa today and being truly indigenous to the Near and Middle East, and having been introduced to India and Australia. It should be explained that the name Dromedary applies only to a particular type of the latter used for and specially trained to run, carrying a human rider. It is believed that the widely splayed, soft-padded, cloven feet of both Camels were originally evolved to aid the animals in

149. *Alpaca*

VAN NOSTRAND FROM NATIONAL AUDUBON





150. *Domestic Llamas*

LA TOUR

mushing through snow, and not for treading the loose sands of the desert. It is certain that, despite the relatively short thin coat of the one-humped species, these animals are as tolerant of cold as they are heat, while the Bactrian or two-humped variety may be encountered plodding stolidly through north Asiatic winter blizzards that would send an Eskimo scurrying to the shelter of his igloo.

Llamas

The original, and still wild Llama, is known as the Guanaco. It lives in considerable herds in all types of open country from the Alto Plano at fifteen thousand feet to the wind-blown prairies of Patagonia. It is a dull browser and rather shy. Apparently this is one animal that did resort to particular locations to die and the most extraordinary descriptions of this procedure have been given by none other than Charles Darwin and W. H. Hudson. From this animal the two domesticated creatures known as Llamas (Plate 150) and Alpacas (Plate 149) have been derived. The former comes in all manner of colors and color patterns, and is a tall-necked,

shaggy beast that spits at those who molest it, often using gravel as ammunition. From it wool is taken and its flesh is eaten. It is also the classic beast of burden. The Alpaca is a most appalling-looking entity, somewhat resembling a partly animated couch covered by a thick woolly blanket from which a cameline neck and head rises. It comes in a wide range of colors from bright red to black, white, and various browns. The wool is very long and matted.

Deer

There are eight major groups of living Deer, two of which comprise well over ninety per cent of all the known forms—these are the True Deer of Eurasia and North America, and the Hollow-Toothed Deer of North and South America. Deer occur indigenously in the Mediterranean zone of North Africa but are otherwise unknown in that continent. They have been introduced into New Zealand and Australia.

The deer are in point of species and of kinds a very numerous group and they are still by far the commonest larger wild animals almost throughout the world.

Muntjacs

There are a number of closely related, small, primitive deer (Plate 151) belonging to this sub-family that inhabit the Oriental Region, being found in southern India, Burma, southern China, on the island of Java, and possibly in isolated parts of the Indo-Chinese area. The body is of deerlike form but rises to a high-domed rump. The tail is short, the feet delicate, and the head very pointed. Males carry tusks that protrude below the chin. They are of various shades of brown, ranging from reddish to grayish or almost yellow. They are distinguished from all the modern deer by having long, bony pedicles arising from two bony ridges that extend up the forehead. These point upwards and backwards and the true horns grow from the top of them. The horns are short and straight and have only a short brow tine. Muntjacs are forest animals and are very shy and retiring.

Fallow Deer

We now come to an almost overwhelming aggregation of very similar animals spread all over Eurasia, North Africa, and the East Indian Islands. To these, well over a hundred different popular names have been given in various localities, yet the vast majority belong to only about a dozen valid species. Of these, two are sufficiently singular to be treated separately.

These are very beautiful small deer (Plate 154), the western form of which has for centuries been kept in parks all over Europe for purely ornamental purposes. This species appears

originally to have inhabited the Mediterranean area. It is of a rich orange-reddish-brown color profusely spotted with white, and white below. The horns are large and widely spread, with numerous tines, those at the top of the main tines developing into hand-shaped or palmate structures. The eastern species is much larger, has smaller and less branched antlers that are not palmated, is very brightly colored and profusely spotted. It is found from Asia Minor through Iraq to Persia.

Axis Deer

These are two closely related deer found in central and south India and Ceylon, and north India, Assam, Burma, Thailand, and Indo-China respectively. The first, known as the Chital (Plate 152), is a medium-sized deer, with large, widely held but simply branched antlers, and is of a rich reddish color with profuse white spots at all ages and in all seasons. The undersides are white. The eastern animal, called the Hog Deer, is small, with antlers that sprout a brow tine and then fork but once. They are pale brown with white spots in summer but of a brindled dark brown in winter.

Red Deer

All the remaining True Deer belong to a single genus and the dozens of races to which all manner of names have been given compose only about a dozen species. It may seem odd to devote so little space to this mass of beautiful, outstanding, and well-known animals but despite their popularity, all deer are very much alike in appearance and habits. They are browsers and almost all inhabit woodlands. Some migrate



151. *Muntjac*

PINNEY



↑ 152. *Chital*
MARKHAM

↓ 153. *European Red Deer*
PINNEY



154. *Fallow Deer*
MARKHAM



seasonally, going up to mountain pastures in summer and descending to the valleys in winter. The males alone grow horns, starting in the late spring and having them fully developed by fall, when the velvety skin covering is scraped off. The horns then fall off in the early spring. The young, which are usually single but may be twins, are almost always spotted and can totter about as soon as they are dropped. Deer make pretty pets but are rather dangerous when the mating season comes around, and a lot of unsuspecting owners have been mauled and even killed by them. All deer are regarded as legitimate game by so-called sportsmen but, except in the wildest country, modern rifles have reduced this pastime to little more than an outlet for one of Man's drearier instincts. However, if not killed in considerable numbers and selectively every year, deer may nonetheless become so numerous in some areas that they eat out all the available food and starve out their own populations.

The first species, *C. elaphus* or the real Red Deer (Plate 153), are spread from the British Isles throughout Europe to eastern Siberia—where they are misleadingly called Wapiti—along North Africa, throughout the Near and Middle East to Afghanistan and then north of the Himalayas to Tien-Shan. These include the Maral of the Caspian Region, the Hangul of Kashmir, and the Shou of Tibet. The American species (*C. canadensis*) used to be found all over the northern continent but are now confined to the Rocky Mountain region. There are at least three species and these are called Elks (Plate 155), which is misleading, since that has always been the original popular name of the Moose in the Old World. The third large species (*C. unicolor*) is the Sambar of India, Malaya, Indo-China, Formosa and the Philippines. There are several varieties.

Thorold's Deer (*C. albirostris*) is a rare species from western China and eastern Tibet that has a white muzzle, lips, and chest. The antlers too are of a pale horny to white color. The Barasingha, or Swamp Deer, of India and Assam (*C. duvauceli*) is sprinkled with white; the Thamin (*C. eldi*) is from the Indo-Chinese area. In eastern Siberia, Manchuria, Amuria, north China, Korea, the Japanese Islands, and Formosa there occur a number of small deer known as Sikas (*C. nippon*) that were regarded as sacred by the Japanese and are now very popular in European and American parks. In the islands of Sumatra, Java, the Celebes, the Moluccas and on other smaller islands are found the Rusas (*C. timoriensis*), which appear to be small forms of the Sambars, and are of a light brown color, usually yellowish below and with rather light horns. Finally, there is a spotted Red Deer in the Philippines (*C. alfredi*).

White-tailed Deer

The other great group of Deer are exclusively American and were probably developed in the Western Hemisphere. There are six distinct genera and a large number of described species. One genus is found in North America, with some species extending through Central to northern South America. The other five genera are exclusively South American.



155. *Wapiti or American Elk*

MUENCH



156. *White-tailed Deer Fawn*

LA TOUR

White-tailed may be used in either a general or a restricted sense. There are over a dozen species all having some white plumes on the underside of the tail—like almost all Cervines, for that matter—but one group of species has come to be called by this name popularly, and this happens to be the common deer of Canada and the greater part of the United States as well as Mexico. The appearance of this is too well known to Americans—especially in its immature form—to require description. The animal varies (Plate 156)—in size, color, and seasonal change, while the antlers of all are of course as variable as those of any deer. The largest races live in Canada, and the smallest, which only weigh about fifty pounds, on a few cays off the coast of Florida. There are species scattered throughout Central America wherever there are “pine barrens,” and some outliers of the genus are found as far south as the Guianas and inner Venezuela and Colombia. A distinct species called Mule Deer (Plates 157 and 160) inhabit the western part of North America from Alaska to Mexico. A race of this deer is known misleadingly as the Black-tailed Deer. These are inhabitants of rocky areas, mountains, and deserts. All White-tailed Deer have very large ears and pronouncedly plumed tails which they use as signaling devices.

Reindeer

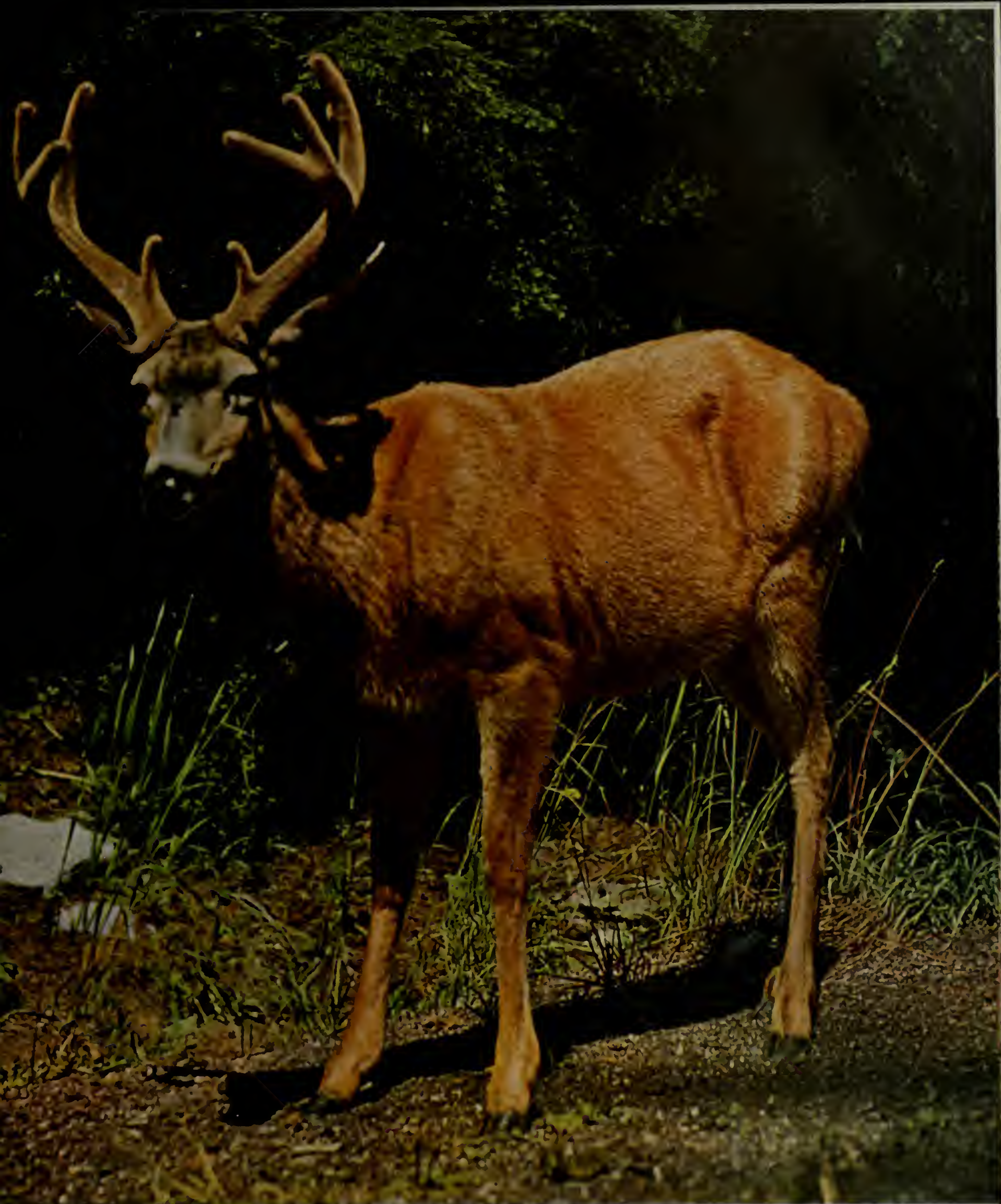
There is always a great debate between Americans and Europeans as to the proper naming of these animals. The former resent the magnificent deer of their country being

classed with, called, and made subsidiary to the rather paltry and very scraggly-looking little animal of Eurasia known for centuries by that name. Nonetheless, all the Caribou are nothing but large Reindeer, and the little moth-eaten creature from the northern parts of Europe and Asia is really a very remarkable beast—in fact, one of the most incredible of all mammals. All reindeer in the wider sense have horizontal backs, short tails, enormous hoofs that clack together when they run, and a pronounced dewlap depending from their throats. This is larger in the males than in the females. Their antlers—which are uniquely present in both sexes—are quite impossible to describe either in general or in the particular. They are wide-spread, slant back over the neck and then bend forwards, outwards and finally inwards again, but they meander and are bilaterally dissimilar, with numerous tines branching off at odd angles and often forming palmate structures. The brow tines are very pronounced and one—usually the left—is palmate and vertical. This grows down upon the muzzle. The complete rack is sometimes, and especially in the Siberian race, positively grotesque. The fur is thick and there is a dense undercoat.

Although there are herds of these animals (Plate 158) running wild on some of the least accessible peninsulas of northern Russia and Siberia, it is improbable that any of them are descendants of a pure line of entirely wild animals, for all the peoples of the Eurasian Arctic have used these animals in a state of semidomestication since time immemorial. Most outstanding as reindeer people are the Lapps of northern Europe who until recently relied almost wholly on these animals for food, clothing and many other things. These small deer, only about six feet in total length and standing three and a half feet at the shoulder, can be ridden for days on end by a man of average weight and can pull twice their own weight on a sled over snow for forty-eight hours at a stretch. One pulled two men in a sled for sixteen hours at an average rate of 18 m.p.h. and another made an historic run of just eight hundred miles in forty-nine hours, pulling a Norwegian officer bearing a warning to his King of an uprising; it dropped dead on arrival. The animal has meat of very high quality, its skin makes fine leather and can be used with the fur on to make clothing or blankets for sleds, and the wool alone can be woven. The sinews make nylon-strong cordage and many small objects can be made from the antlers. Finally, its milk is so rich it has to be mixed with three times its volume of water before it can be drunk, and from it cheese, whey, and an alcoholic beverage can be made. Yet, these animals feed mostly on mosses, lichens, and a certain amount of grass.

Roe Deer

The last sub-family of the deer, and one of the most distinctive, happens to be the best known of all deer to Europeans and to most peoples dwelling in Asia north of the Himalayan-Tibetan barrier, for it is the common small deer of the Eurasian temperate woodlands. It is known as the Roe



157. *Black-tailed Mule Deer. in velvet*

MUENCH



158. *Domestic Reindeer*

MARKHAM



159. *Roe Deer*

MARKHAM

Deer (Plate 159) and has been hunted since time immemorial, yet it still abounds in woods between the most highly industrialized areas of Europe. It is a small, rather compact deer with small upright antlers that lack a brow tine but start forking near the tip of the main stem. The horns are usually knobbed about the base and this may extend almost to the tip of all the tines. Odd specimens are sometimes shot in which the horns form a partially combined mass, looking like brown coral or certain kinds of stalagmites. In summer, most of these animals are of a rich, reddish brown with an orange tone on the flanks and white below. In winter they go brown, with a

yellowish grizzling and a large white patch developing on the rump. These small deer are found all across Eurasia from the British Isles to eastern Siberia and south to the Caucasus, thence north of the central Asiatic desert belt to inner China, Mongolia, Manchuria, Amuria and Korea.

Giraffes

All living giraffes are sufficiently alike to be grouped in one species; however, there are five very distinct kinds, each of which would undoubtedly be called a species if their individual members did not vary so much in color pattern and if

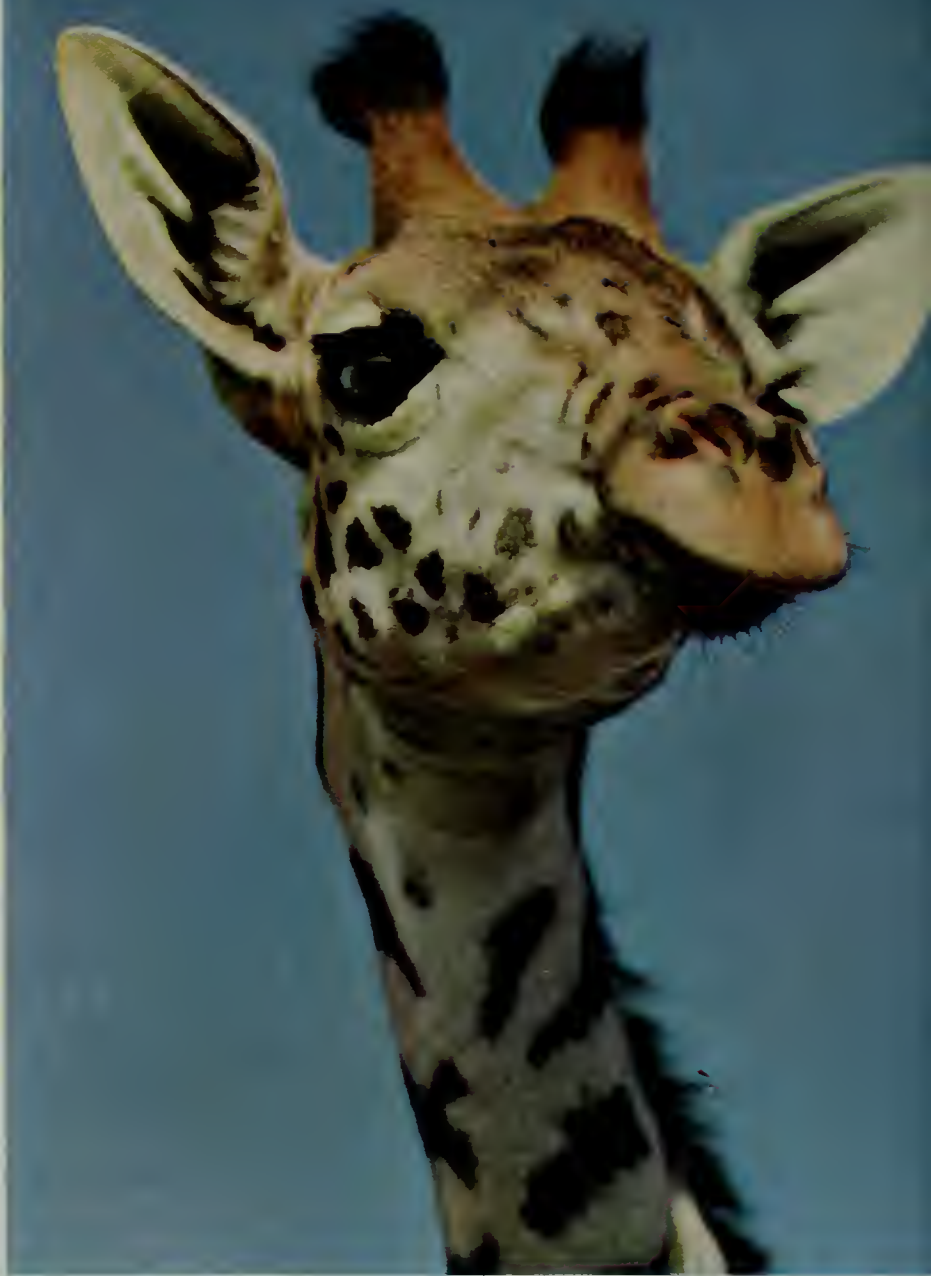
160. *Mule Deer*

L. W. WALKER FROM DESERT MUSEUM



161. *Masai Giraffe*

COMMANDER GATTI AFRICAN EXPEDITIONS



162. *Head of Masai Giraffe*

COMMANDER GATTI AFRICAN EXPEDITIONS

some of the forms did not actually intergrade. Detailed description of the sundry forms is of particular interest only to zoologists and the chosen few who can take hunting trips to Africa. (Exact descriptions may be found in T. Donald Carter's *Hoofed Mammals of the World*.) All Giraffes have a pair of small fur-covered horns and in most there is a third bumplike protuberance placed medially in front of these on the forehead. In the South African or Cape Giraffe (Plate 163) it is absent. However, one form, the Baringo Giraffe from the borders of Uganda and Kenya has, in addition, another small pair placed between these three.

In color all giraffes are basically white upon which a complex pattern in various shades of brown is depicted much as a pattern is spread on a wallpaper. In those forms found north of the equator this does not extend to the legs; in the two forms found on the equator—the Congo and Reticulated—it does so sparingly down to the hocks; in the forms found

south of the equator, the legs are fully marked to the hoofs. The pattern likewise varies from north to south and takes sundry strange forms. Fundamentally, it is composed of a reticulation of light lines forming a crocodile-hide arrangement, all the spaces between being filled with brown. The light reticulation, however, varies in width, and the brown may merge with it, so that in some types the animal is white with buff spots, each centered by a dark brown blob. Further, the brown blobs may take a leaflike or starlike form, as seen best in the Masai (Plates 161 and 162) and Rhodesian Giraffes.

Giraffes are scattered all over tropical Africa from the east Sudan to South Africa and up the west coast to northern Angola. There is an outlier race in northern Nigeria. They strictly avoid the closed-canopy forest and stay on the drier savannahs and orchard bush where they browse on the uppermost leafage of the thorny, flat-topped acacia trees, some fifteen to twenty feet above ground. They live in loosely knit communities, family parties keeping close together. They are mild-mannered giants, relying on their keen sight to keep out of danger and their speed to remove themselves from it. Although their gait appears awkward in the extreme, they

can cover ground at a great rate in a long loping gallop with enormous strides. Males will do battle and use their heads and long necks as clubs, whacking at and sometimes stunning each other. Both mothers and fathers will defend their young against the great cats with determination and there is an authentic record of one having kicked the head clean off a lioness' shoulders. They kick forwards with the front feet and with tremendous power, having a foot-wide hoof and an eight-foot shaft of solid bone and sinew behind this. Giraffes are not absolutely voiceless as popularly supposed: they have been heard to make a rather tragic gurgling whimper, and mothers make a whistling sound to call their young.

Pronghorn

Before the colonization of North America by Europeans, untold herds of hooved mammals roamed the prairies of the central and western part of the continent from the southern boreal forest tree line in what is now Saskatchewan and Alberta to the central plateau of Mexico. The most numerous of these were the mighty Bison; the next most numerous a rather delicate but somewhat ugly-shaped animal with later-

163. *Cape Giraffe*

MARKHAM





164. *Pronghorn*

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ally compressed upright horns bearing a small tine or point near the top at the front, known as the Pronghorn, or American Antelope (Plate 164). Nothing at all like these animals is known anywhere; they are a solitary leftover from pre-glacial times, when their tribe was much more varied. Nothing is known of the origin of these animals as a whole. They appear to be of exclusively North American origin, to have evolved there, and never to have spread to other continents. In a manner of speaking, they are a sort of minor experiment in "antelopes," initiated by Nature and then dropped. They undoubtedly have closer connections with the Bovine than the Traguline-Cervine-Giraffine group.

They are about the size of an average goat, have deerlike feet, rather sheep-shaped heads, erect ears placed on top of the head, and short tails. In color they are sandy brown, with light throat bands, and are white below. The rump has a large, circular, glistening white signaling patch composed of a huge rosette of long hairs that can be spread at will by means of special muscles immediately under the skin. All the peltage is

rather hard and coarse and the individual hairs are pithy. The horns are the most exceptional feature of these animals. Although branched, they are hollow sheaths growing on a permanent bony core like those of oxen and antelopes. However, most surprisingly, they are shed annually like those of deer though by a different process. Instead of breaking off clean at the base, a skin covered with velvety hair grows out of the bony core, but inside the horny covering, and forms a second horny sheath underneath the original skin. As this thickens, the old outer horn splits and is burst off by the actively growing "velvet" inside. The whole process is complex and hardly seems worthwhile in view of the fact that the horns appear to be mere adornment, those of the females being only tiny unforked spikes.

Bovine Beasts

All the remaining hoofed mammals with an even number of toes have until recently been lumped together in one vast family. They fall into three great natural groups—the Bovine



165. *Zebu Bull*

PAUL MILLER



166. *Yak*

MARKHAM



167. *Ankole Cattle*

YLLA FROM
RAPHO-GUILLUMETTE



or Oxlike, the Antelopine, including the Gazelles, and the Caprine, or Goatlike.

Cattle

The origin of our domestic breeds of cattle is a subject that has just as much right to constitute a separate science as does the study of Man's origins. There is no doubt that a large species of ox, known until the end of the Dark Ages in Europe and the Near East as the Aurochs, played much if not the sole part in the ancestry of European cattle. However, there may have been other smaller species of wild oxen involved in this that became extinct even earlier. In tropical Africa and in Asia there were undoubtedly wild species that were early domesticated or at least herded and which contributed to the establishment of the huge-horned Ankole (Plate 167) and the humpbacked, dewlapped Zebu (Plate 165) respectively. In fact, these animals may be intrinsic species all members of which were long ago corralled by Man.

There are four very different kinds of wild cattle known—the Gaur, Banteng, Couprey, and Yak. The Yak (*B. grun-*

niens) (Plate 166) is an exaggerated kind of ox that is indigenous to the uplands of Tibet and used to roam in enormous herds all the way from Kashmir in the west to China in the east but which has now, in the wild form, been hunted back to a few isolated areas in the eastern part of its range. Nevertheless, this animal has been domesticated in Tibet for centuries and produced there a smaller, more docile breed which, in its extreme form, is excessively long-haired and lacks horns. Yaks are used as beasts of burden and for riding and are herded just like other domestic cattle, being milked regularly and slaughtered for their excellent meat. Yak butter is exceptionally rich and is used in tea by the Tibetans as we use milk.

Buffalo

There are three kinds of buffalo. The best known is the Water Buffalo (*Bubalus bubalis*) of India and the Oriental Region generally. It is certain that there still are truly wild stocks of this animal, notably in Borneo, and possibly in the Celebes, Sumatra and Java, but there is considerable doubt

as to whether any in India, Burma, Thailand, Indo-China or Malaya are other than feral. The animal has been domesticated for so many centuries and has been so widely disseminated throughout the tropics—even to the United States—and it is kept in such loose confinement in many countries that it is hard to say which herds are truly wild. This species is a dark grey, semi-aquatic ox with a small shoulder hump and a dewlap between the front legs; it has huge back-sweeping horns with transverse ridges. The head is large and held low but the neck is relatively slender. They are patient beasts that can be kicked on the snout by small boys but are deadly to strangers and particularly “foreigners.” Many a tourist has been killed by these animals when attempting to photograph them at their daily tasks and there are countless tigers that have succumbed, presumably in stunned amazement, to a swipe from their horns. Their strength is amazing and a pair can pull three combined teams of trained draft-oxen.

The Buffaloes of Africa (*Syncerus*) comprise two species, one a forest animal (*S. nanus*) which rather distressingly has a form living outside the forest, and a larger animal (Plate 169) commonly known as the Cape Buffalo (*S. caffer*), found exclusively outside the closed-forest, from the southern Sudan,

all down the eastern side of Africa to South Africa. This is a very large, powerful and aggressive ox with heavy-based horns meeting on the mid-brow and then sweeping outwards, backwards, and finally forwards at the tips. It prefers moist and swampy ground but may suddenly appear in dry areas when suitable grass is available. It travels in herds and should be treated with great respect as it will mount a vicious attack, is clever, and extremely agile. It gores with its horns and then kneels on its victims but it also has another unpleasant weapon in its tongue, which is like a very sharp wood-rasp and can tear skin and flesh.

Bison

Very closely related to the wild Cattle, and able to interbreed with them, are the Bisons of Eurasia and North America. These two are quite distinct species.

The American Bison (Plate 172), miscalled “Buffalo,” is a larger and heavier animal with a more extensive cape, shorter horns, a pronounced top-knot, and a long woolly beard. The front legs of the bulls are furred as though wearing what used to be called “plus-fours.” There were once several forms of this animal but only two remain. The larger Wood Bison of northwestern Canada is still truly wild, having survived un-

168. *Water Buffalo*

LA TOUR

169. *East African Buffalo*

COMMANDER GATTI
AFRICAN EXPEDITIONS





170. *Common Eland*

MARKHAM



171. *Nilghai*

MARKHAM

touched since prehistoric times; the western Plains Bison was rescued from total extermination at the turn of this century when there were less than a thousand left. The latter animals were once also found in a strip of territory from Lake Erie south to Georgia but this eastern form was extinguished by 1800. The western herds roamed the prairies from Canada to central Mexico in endless millions, drifting about in a form of seasonal migration; they were followed by the great grizzly-type bears and by some Amerindian tribesmen who, combined, were just sufficient to preserve the optimum balance in the bison's numbers. The arrival of the white man with his mania for wholesale slaughter of anything alive—and, on this occasion, often for no other reason but the tongue of the animal—quickly altered the situation by direct, senseless, and wanton extermination. The animal is now making a wonderful comeback on reservations and in semi-domestication.

The Nilghai

The form of this large beautiful animal is amply shown in the accompanying Plate 171. They are of a bluish shade though the pelt is really grey with a little brown, but the females and young are usually of a reddish-brown color. Only the male bears the small, smooth, forwardly-curved horns, but both sexes have a small neck mane and a patch of long hair on the rather humped shoulders. The males have a pendent tuft of fur on the throat. These animals live in glades in the forests, in open forest, and on park lands and they prefer low hilly country. They go about in small bands and are still fairly common throughout northwest, central, and northern south India. They form one of the principal articles of diet of the Tiger and have always been extensively hunted by men but seem to be able to hold their own. Despite their long legs and necks and sharply sloping bodies, they have a very oxlike appearance; nevertheless, they are customarily referred to as "antelopes" in India.

Elands

Closely related to the Nilghai are a fairly large group of African cloven-hoofed animals, distinguished by having large horns with a pronounced spiral twist. They are also distinguished by having a curious arrangement of widely separated, light, vertical stripes on their sides, sometimes augmented by a complex arrangement of dark median and bilateral, light, horizontal stripes along the flanks.

There are two species of Eland, one found along the southern edge of the Sahara from Senegal right across Africa to the eastern Sudan and known as the Giant Eland; the other (Plate 170), from South Africa, north to the Congo border on the west and to northern Kenya on the east. They are huge oxen, standing almost six feet at the shoulder in the case of the bulls, with heavy twisted horns, a large dewlap, a tuft of long hair on the forehead, and pronouncedly humped shoulders. They have long oxlike tails with a terminal tuft, and they usually display the harness-markings of their group but some are plain-colored, and old individuals often lose a lot of



172. *American Bison*

GRANT



173. *Greater Kudu*

VAN NOSTRAND
FROM
NATIONAL AUDUBON

their hair and look grey in color. The bull Giant Elands also have a small, black mane. This species is a browser; the southern form is a grazer. Elands go about in large herds and prefer the savannahs and open-canopy forests where there is plenty of shade; they are rather indifferent to other animals, including man, unless they have been constantly hunted. They will defend their kind from marauding lions and even a half-grown Eland can pound a lion to death with its forefeet if the cat happens to be insufficiently agile. Both sexes carry horns.

Kudus

There are also two species of Kudus, the greater (Plate 173) being much the commonest and still occurring all over south Africa, west to northern Angola, and east to Abyssinia. The

Lesser Kudu is identical in general shape but the color and markings are much more vivid, and it has no crest on the shoulders and no throat mane. It is much smaller and there are white areas on the throat and chest. The Greater Kudu is an upland animal and sometimes lives at very great altitudes among the giant heathers above the tree-line. The Lesser Kudu lives in the desert scrublands and the thorn forests of the semi-deserts and ranges from Abyssinia to southern Tanganyika. The horns of the greater species are enormous and have a very wide spread; they may measure five feet in length.

Sabre-horned Antelopes

The Antelopes proper are an extremely numerous group and, with about half a dozen exceptions which will be noted

in due course, are exclusively African. Even the keenest sportsman is apt to retreat in mystification when confronted with anything like a complete list of them, and zoologists have been hard put to it to classify them. However, they fall into five major groups, each containing several outstanding types. Countless sub-species and local races have been described but with these we will not concern ourselves since they are based only on slight differences in color and horn structure. The Antelopes are savannah, grassland, scrub, and desert animals and none is found in any kind of closed-canopy forest. Like the Bovines, they have solid, permanent bony cores to their horns and these are sheathed with horny coverings. The Common Sable (Plate 174) is, as shown, dark brown to black in the males and brown in the females, and contrastingly white below. There is a slight throat mane and the horns form semicircles. It ranges from the coastal plains of Kenya to the Transvaal.

Hartebeests

The general form of these animals may be seen in the photograph of Coke's Hartebeest (Plate 175). There are half a dozen clearly recognizable forms, two of which constitute distinct species. They are all of a somewhat reddish-brown color and most of them have darker to black legs and faces, with the tail plume usually black. They all have elongated faces topped by upright horns which grow together at their bases from a tall bony pedicle clothed in skin and fur. There is a slight shoulder hump and the body then slopes away rapidly to the tail base. The horns of all of them are lyrate when seen from the front but, looked at from the side, they are shaped like an "S," going first backwards and upwards, then

forwards and upwards, and finally backwards and upwards again. The most exaggerated are those of the Lelwel which is found from the Sudan to Kenya and west into French Equatorial Africa. The first hartebeest to be known was commented on by Roman governors of Barbaria, having in their day been very common all across North Africa from Morocco to Egypt. It was called the Bubal and it became extinct only in this century. It was once considered to be a horned horse. Other species are distributed all over Africa in the zones lying between the true deserts and scrublands on the one hand, and the true forests on the other, but mostly on the grasslands, where they are one of the commonest forms of game. One species is known as the Kongoni.

Gnus

These animals, so popular in crossword puzzles, are among the most remarkable of all ungulates and behave in a manner than can truthfully be described as hilarious in the old and purist sense of that term. They are of sturdy, horselike build, with heavy forequarters and slender limbs but they have very long, plumed tails with terminal hairs that almost reach the ground. Their foreheads and necks, both above and below, and their shoulders are adorned with long hair forming a sort of exaggerated crew-cut and a scraggly mane. Their horns, seen from the front, look like those of a Cape Buffalo but are more slender; from the side they are seen to rise a little off the crown, then grow straight out laterally, and then curve forward and at the same time make a sweep upwards. There are three forms—the White-tailed of South Africa, now existing only in semidomestication on farms and heavily protected, the Brindled, and the White-bearded

174. *Sable Antelope*

VAN NOSTRAND
FROM
NATIONAL AUDUBON





175. *Coke's
Hartebeest*

MARKHAM

(Plate 177). They wander about the open grass plains in large, loosely associated herds, each component of which is usually led by an old female. They are great bluffers and extremely intelligent, waiting till man or other offensive beast comes within a certain distance, then getting up and standing to face the intruder. If he persists in approaching they start a series of imitation charges, kicking up dust, dashing about with heads down and tails lashing but finally making off in orderly retreat. After going some distance they then suddenly about-face, form ranks, and stand to stare again. Sometimes they will suddenly all go galloping off at a great rate and at a tangent either to left or right, and end up on the intruder's flank at the same distance, and then stop to stare some more.

The South African species is dark brown with a white tail and black frontal fuzz and mane. The Brindled is blue-grey in color with dark brown vertical stripes on the side of the neck and flanks, black mane and tail. Its range is north of that of the White-tailed Gnu, from western Angola to Mozambique and north to Nyasaland. The White-bearded species is sim-

ilar to the last but has a white throat and dependent neck fringe and is found all over the grass plains of East Africa. For the benefit of crossword puzzlers, these animals are also known as Wildebeests.

Marsh-Antelopes

The members of this group of antelopes are actually more deerlike in form than the last. What is more, they behave more like deer. They vary in size from that of a small horse to a sheep and are found all over Africa but only in a very special natural niche. This is hard to define properly, as it does not constitute one of the major vegetational zones but rather a particular environment within two or three zones. Thus, these animals are not found in the forests or on the savannahs or among the scrub but in and around marshes, swamps, reed-beds and canebrakes wherever they occur within those zones. Some species will wander far from water or even marshy ground, provided there is tall grass, and one species customarily lives on open mountain grassfields. They fall into four distinct groups.

176. *Waterbuck*

YLLA
FROM
RAPHO-GUILLUMETTE



177. *White-bearded Gnu*

VAN NOSTRAND
FROM
NATIONAL AUDUBON





178. *Arabian Gazelle*

PINNEY



179. *Grant's Gazelle*

MERLYN SEVERN FROM LANE



180. *Impala*

MARKHAM

181. *Red-fronted Gazelle*

MARKHAM



182. *Bharal*

MARKHAM



Waterbucks

There are two closely related Waterbucks, one (Plate 176) found all down the eastern third of Africa from the borders of Abyssinia to the Transvaal, the other, known as the Defassa, cropping up in suitable localities all over the rest of Africa south of the Sahara from Gambia to the eastern Sudan and south around the eastern edge of the Congo Basin to Angola. They are large, heavy-bodied antelopes with wide-spreading horns well ridged at the base. They are clothed in rather long coarse hair that forms a thick ruff on the throat, chest, and along the underside. Water is not essential to their well-being but they never stray far from reed beds or tall grasses and they do not enter the closed forest. If caught young they make very delightful pets and will wander freely around the house.

Gazelles

We here come to the largest group of Antelopines and the one which has the greatest number of forms. Most of these belong to the genus *Gazella* and all are, except to zoologists and keen sportsmen, very much alike. There are, however, some types so odd as to warrant special note. Most of the Gazelles are desert animals but they also inhabit the grassy plains, the scrub zone, and parklands. They are small, delicate antelopes with spreading horns that are heavily ringed at the base.

Impala

The largest of the group are very widely known as Impala and are unlike most gazelles in that they inhabit many types

of country, associate with all manner of other game, and have large, wide, spreading horns in the form of a lyre when seen from the front. They are found all over South Africa, west to Angola, and north to Uganda. They are the all-time champion high-jumpers and are the light-bodied, pale brown antelopes that are almost always seen in movies of Africa, flying off in all directions through the air at the most unexpected moments. The females lack horns.

True Gazelles

There are over fifty described forms of this genus, all looking very much alike. Their general form and coloration may be seen in Plates 178, 179, 180, and 181. Collectively, they are found all over Africa outside the forest zones, and one, the Dorcas, occurs in Palestine and Syria, another in eastern Arabia, a third in western Arabia, a fourth on the plains of India, and still another, all across central Asia from Turkey in the west to the Gobi Desert of Mongolia in the east. There is a small species in the Atlas mountains of Morocco, Algeria and Tunisia known as the Edmi. All have back-curving lyri-form horns that are strongly ringed, except the Edmi, which has small, upright spikes, and Loder's Gazelle of the same areas and east to Egypt and the Sudan, which has very tall horns that rise straight up and then curve gently outwards. Grant's and Robert's Gazelles of the East African plateaus have the longest horns, those of the first being lyrate, of the latter curving backwards, then outwards and finally downwards.

Goats

This is the last of the great subdivisions of the Even-toed Hoofed Mammals and, although by no means so numerous



183. *Rocky Mountain Sheep*

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184. *Mouflon*

MARKHAM



in specific forms as the Bovines or the Antelopes, is just as diverse. As the general title implies, these are the goatlike animals, but it is almost as difficult to separate goats from antelopes as it is traditionally supposed to be to separate the goats from the sheep. Almost all the Caprines are animals of the mountains and they are distributed indigenously throughout Eurasia and North America but only two or three species are found in Africa, and none is found in South America or, of course, Australia. They are distinguished by having heavy and sometimes massive horns composed of an outer, horny sheath on a solid and permanent bony core. These horns are almost invariably strongly cross-ridged, and they usually curve and twist. Except in a very few cases, horns are present in both sexes but are much smaller in the females. There are five major groups of Caprines.

We here meet a situation comparable to that which we encountered in dealing with the dogs. Although we manifestly have millions of animals that we call "goats," we know of no such creature in the wild state today, nor have we the fossilized remains of any animal from which these animals are surely descended. The wild goats living today are all somewhat exaggerated forms that can clearly be classified as Tahrs, Markhors, Ibexes, or Turs, and it is hard to conceive of any of these giving rise to our everyday domestic goats. As the latter are of considerable range of shape and have a wide variety of horn structure it is very probable that they have a multiple origin and the species from which they were originally created were probably captured and taken over *in toto* by early man, all wild examples being hunted out. The domestic goat appears to have originated in the Near or Middle East and is obviously an animal of the dry scrublands. The remainder are all mountain animals.

Tahrs

There are three species of Tahrs found in the western Himalayas (Plate 185), the mountains of Southern India, and certain areas of southeastern Arabia respectively. The first is the largest, the last the smallest. They are typical goats, with small, backwardly arching horns and would be the most likely candidates for the ancestors of our domestic breeds were it not for their surprisingly isolationist attitude. The Himalayan animal is of a reddish color, the Indian, brown, and the Arabian, greyish. The first is thickly clothed and has a shaggy mane around the neck, over the shoulders and hanging down to its knees. The Indian has rather long fur and a grizzled white saddle across the back; the Arabian is sleek-haired. Their tails are short and can be elevated. The horns grow very close together and are almost semicircular in section, their flat faces facing each other inwards. In habits, they are also typical goats, being very agile climbers and eating almost everything vegetative.

Sheep

The old saw about separating the sheep from the goats is not as funny as it seems to Europeans and Americans where



185. *Tahr*

LA TOUR



186. *Aoudad or Barbary Sheep*

MCKINNEY FROM SHOSTAL

the domestic breeds of the two animals are quite distinct. The author narrowly escaped serious trouble in one part of Africa after giving an animal to a native chief under the impression that it was a sheep—a most acceptable gift—only to learn that the majority of that dignitary's retainers declared it to be a goat, which happened to constitute a dire insult in that country. Nor can science be called upon for any clear definition, except to point out that the goats have a transverse slot across the pads under their hoofs; but, then, there are breeds of sheep in Africa that also have these.

The Aoudad

This is otherwise known as the Maned or Barbary Sheep (Plate 186) and is found all around the Sahara, being the only indigenous sheep of Africa. It is a very large species, the rams having most powerful forequarters and a long, plumelike fringe of rather soft hair hanging from the chin to between the front legs, and also wearing a pair of hairy "shorts" on the front legs. The horns are large and very thick, with a distinct keel at the base and small cross-ridging. They sweep

outwards, backwards, and then inwards. The females bear small slender horns. Aoudads are rock-climbers and are almost as nimble as the Rock-Goats, the young especially being able to walk along perpendicular faces, using the tiniest ridges as footholds. But even the great rams go into the most impossible places, holding their heads sidewise to balance their great horns.

The Bharal

This animal (Plate 182) is also known as the Blue Sheep and is an inhabitant of the Himalayas from central India to central China. It is a beautiful blue-grey color above and white below, including the inner sides of the limbs. A black band separates these two colors all the way from the head to the front edge of the forelegs, then along the flanks and down the front of the back legs. The horns of the ram go outwards and backwards, then inwards and upwards like those of the Tur—which the Bharal greatly resembles. In fact, it stands about halfway between the sheep and the goats.

True Sheep

On the southern slopes of the Himalayas in Afghanistan and thence south to Baluchistan the wild sheep are known as Urials. They are short-haired and mostly of a reddish hue with a very dark chest ruff but light limbs and undersides. They vary greatly, however, and there are types with white ruffs and dark legs. Their horns are tightly curled so that the tips come opposite their eyes.

Another group of wild sheep inhabit the Mediterranean area—one, the Mouflon (Plate 184), comes from the islands of Corsica and Sardinia; the other is spread from Turkey and the island of Cyprus to the Caucasus and the north Persian Mountains. They are red in color with a light greyish saddle, and are white below. The females are hornless but the males bear large pairs that curve back almost on to their shoulders. They are rock-dwelling animals like the Aoudad but they graze on upland pastures and take shelter in any available woods.

The last group of wild sheep are North American. There are two distinct species but races are found in Kamchatka and the Stanovoi Mountains of extreme eastern Siberia. The first is known as the Canadian, Rocky Mountain, or Bighorn Sheep (Plate 183) and ranges from British Columbia to Lower California and the western Sierras of Mexico. There are numerous races but all are some shade of grey-brown with darker forequarters and lighter undersides, nose and rump patch. The horns are massive and tightly coiled. The second species is, in its extreme form, very distinct, being of lighter build and pure white all over. However, there are grey forms and these appear to intergrade with certain races of the Bighorn that happen to have rather small horns, so that the white animals, known as Dall's Sheep, may themselves be no more than a race of the Bighorn that has only recently become separated from the main stock.

Hyraxes

ANOTHER small group of mammals that has caused zoologists considerable headaches, and generations of ordinary people much confusion, is that of the little rabbit-shaped animals now usually called Hyraxes. At other times they have been called by various other popular names, the best known of which was Coneys, a name that has also itself been applied to various other mammals and notably to rabbits. Hyraxes are apparently the animals referred to in the Bible as Coneys. They look rather like short-eared rabbits and the best known of them, found in the Mediterranean region lives in holes among rocks and leads much the same life as some species of those animals. However, Hyraxes have teeth like rhinoceroses, and small hoofs on their toes.

Tree-Hyraxes

In forested areas, the place of the Coneys is taken by a group of closely related animals (Plate 187) that dwell almost exclusively in trees and that seldom come to the ground. Several distinct species may be recognized, each more or less isolated in one major forest tract. Thus, there is a large dark grey-brown species in the southeastern forests south of the Zambesi, and another with a bright yellow underside, which lives at elevations of 7000 to 10,000 feet in the montane forest about Kilimanjaro. A third type lives in West Africa and has shaggy black fur, each hair on the back being tipped with white. One species of Tree-Hyrax, however, does not normally live in trees but inhabits the open grasslands north of the forests in west-central and west Africa.



187. *Tree Hyrax*

MARKHAM

Elephants

ALL the ten to fifteen thousand different kinds of mammals now inhabiting this earth probably display some feature or have some habit that is unique if only we knew more about them, and many times in this book we have remarked that some particular kind is one of the oddest of all mammals. About no animals can this be more truly said than about elephants. In almost every way they are most singular and in many respects they are unique. In fact, they have much more right to be taken out of the animal kingdom than we ever had. They are probably the most highly evolved form of life on this planet, meaning that they are furthest removed from the primitive basic mammals without having become grossly specialized. That they walk on the tips of their fingers and toes, have "knees" that, like ours, bend forwards, and have developed their noses into grasping organs does not render them either grotesque or dangerously overadapted to their environment and way of life. Like men, they are really fairly basic but for a few highly useful adjuncts. Like us also they have enormous brains—in point of fact, but not of course in proportion, bulkier than ours. It is in their mentality, however, that elephants are so outstanding. These animals have lived with men for millennia but have steadfastly refused to become domesticated in that they will not breed in true captivity—though of course individuals have been born in such circumstances.

All sorts of exaggerated and bizarre qualities have been attributed to them, most of which have never been confirmed by modern scientific observation, yet even the slightest intelligent association with these huge creatures will startle one into believing almost anything about them. Elephants vary in personality like any other animals: there are among them intelligent ones and blithering idiots. As a whole, they have good memories but they forget just like us. Much more strange is the undoubted fact that some at least actually learn to understand human speech. By this is not meant the kind of automatic response of a dog or chimpanzee to certain sounds or the timbre of a particular voice. A good elephant man will literally introduce you to his charge and once you have been touched lightly by the animal's trunk you may almost invariably—if confident and acquainted with the language to which the animal is accustomed—stand perfectly still and talk the great beast into performing a wide variety of actions up to the limit of its hearing, and this even if you use different terminology from that to which it has become accustomed. Even naturalists often fail to appreciate the further fact that elephants have very pronounced personalities of their own and that, like us, they are prey to complex emotions. The

apes may be said to be temperamental and thus unpredictable, but elephants are even more like human beings, and particularly highly civilized human beings, in that they may resolve petty frustrations or plain liver disorders by the transfer of their pent-up feelings into quite unrelated channels. Thus, they are really extremely dangerous creatures because they not only reason but may, like us, act illogically. Many if not all elephant trainers are highly aware of this and usually take all possible precautions, especially at the time of *musth* or periodic sexual excitement, which comes upon elephants at regular intervals.

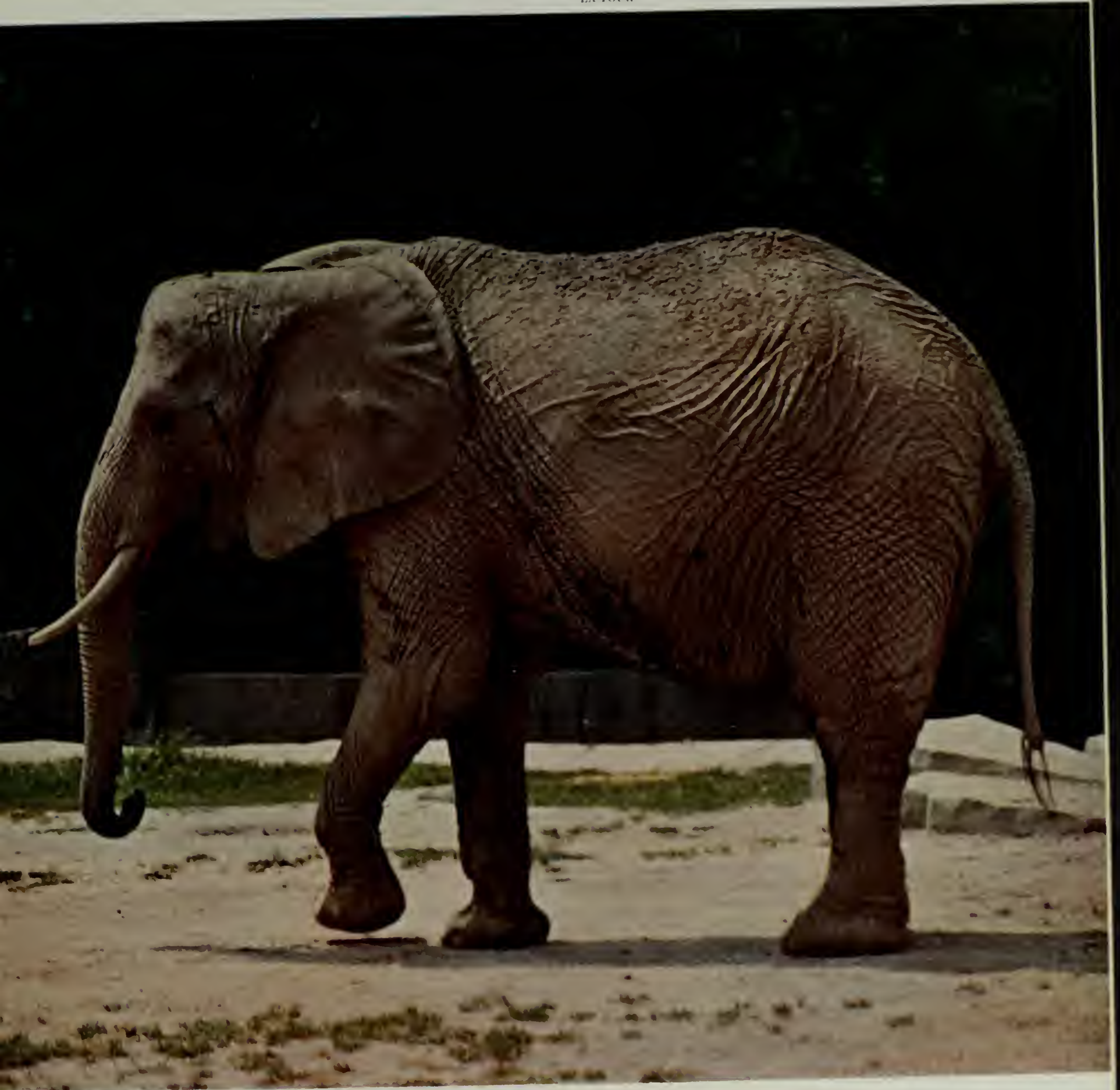
An enormous amount has been written about both the Oriental (Plate 189) and the African (Plate 188) animal but if anyone is interested in reading more extensively about these animals we would suggest the writings of the Englishman J. H. Williams, or the Indian Dan Gopal Mukerjee. The former lived with working elephants in Burma; the latter—although he wrote and died in America—was brought up among wild ones in India and was steeped in the uncanny lore of his ancient caste, the members of which understand aspects of animal behavior that are completely beyond the realm of our current, purely materialistic understanding. From the writings of these two, it will be seen that no exact but compact description of the habits of elephants can be attempted.

To generalize, however, it may be said that both kinds of elephant-like animals are gregarious, tribal, and social creatures, having a wide complex of community laws, rules, and regulations, a marked discipline and many well-established customs. They are nomadic, either traveling back and forth between two extreme points every year in accord with the seasons, or moving around a set course over longer periods that may take them as much as ten years to complete before arriving back at any one point. Females assist each other at the birth of the young, many duties being performed by these nurses rather than the mother. Young males may only mate after a specified period and, although sexual dueling is in order, again in this certain set rules of procedure are observed. Old or imperfect males, or gross individualists may leave the tribe and live alone and then appear to be permanent exiles. If only temporarily ill or out of touch with their own tribe, they may, however, be permitted to join others temporarily and then rejoin their own group.

The gestation period, contrary to most popular belief, is 18 to 22 months in the Indian elephant and about 21 in the African; the young are weaned in about 5 years, and their rate of growth, the age at which they reach puberty, their life-span, and their gerontic progression are exactly similar and equal to that of man. The average life-span of a captive elephant, and as far as we know of wild ones, is sixty years and none over seventy-two years are authentically known although the life records of thousands have been kept by the great teak companies of Burma and by numerous organizations in India. The famous "Jumbo" was killed by a train in Canada at the age of forty, and "Napoleon's Elephant" turns out to have been a series of three individuals none of which

188. *African Elephant*

LA TOUR





189. *Indian Elephant*

LA TOUR

survived more than forty-five years! Indian elephants may, like men, live to greater ages and possibly even to be centenarians but so far we have no record of such. The African animal may be different. This species has only recently been tamed and domesticated, and apart from the Union of South Africa, white men have not been anywhere in its domain long enough to dispute or confirm the assertions of experienced native hunters who affirm that certain clearly recognizable lone bulls have been known to frequent a particular area for centuries. The African's idea of time is not ours, however, and until comparatively recently a fifty-year-old man was quite ancient indeed in that continent.

As has already been said, the two animals called elephants are really quite different beasts, though they are but two offshoots of a very much more numerous group constituting the order Proboscidea. This has a most venerable ancestry, going back over fifty million years to small tapir-like animals. The intervening gap is rather better filled than in the case of other mammals except for the horse and the camel, and from almost countless fossil remains we can piece together a huge family tree with some extraordinary side branches. Not only were there vast hairy beasts like the Mammoths, and sort of depressed and elongated parodies of present-day elephants—the Mastodons—but all manner of large creatures with tusks in both jaws, in the lower jaws only, or without tusks. The living animals are two of three genera in a single sub-family of this great assemblage.

The African Elephant is the largest living land mammal; the Indian Elephant, however, is not the second largest. This place is taken by a race of the African Ceratothere or White Rhinoceros. The largest Elephant is recorded as standing twelve feet eight inches at the shoulder (though the measurements of this specimen, in a museum in England, have been disputed); the record seems to be 12 feet 6 inches. For the Indian it is 10 feet 8 inches. The size to which the tusks of either species may grow is open to considerable doubt, all manner of extravagant claims having been filed, but, from the records of the long-established ivory merchants of London and Hamburg, through whose hands millions of tusks passed over the centuries, it would seem that the largest Indian elephant tusk is 8 feet 9 inches, measured along the curve, and weighs 161 pounds. The record African tusk is 11 feet 5 inches and weighs 293 pounds. Of course, a great deal of Mammoth

ivory dug from the frozen muck of the Siberian tundra also came on the market and this is of far greater dimensions.

* The fable of elephant graveyards at a few localities in both Africa and the Orient may be totally rejected. No such place has ever been found, and several cases of elephants dying or recently dead from natural causes are on record. In fact, the bones of elephants are just about the only remains of defunct animals that are ever found in the tropical wilds and this because they are just so big that even fungi and bacteria take some time to demolish them.

Another myth that must be dispelled, though the general public will probably never accede, is that of the "Pigmy Elephant." The most elaborate searches and the most profound researches have failed to bring to light any trace of such an animal. It is true that there are in parts of the Congo rather hairy races of Elephants that tend never to reach the average dimensions of the open-country populations, but neither these nor the smallish races from West Africa are in any manner a separate species, and none, when adult, is notably smaller than any others. There are, of course, elephants that grow to monumental proportions as in men and other animals, and there may presumably be runts that never reach even the average of their sex; but of a Pigmy species or race there is so far no trace.

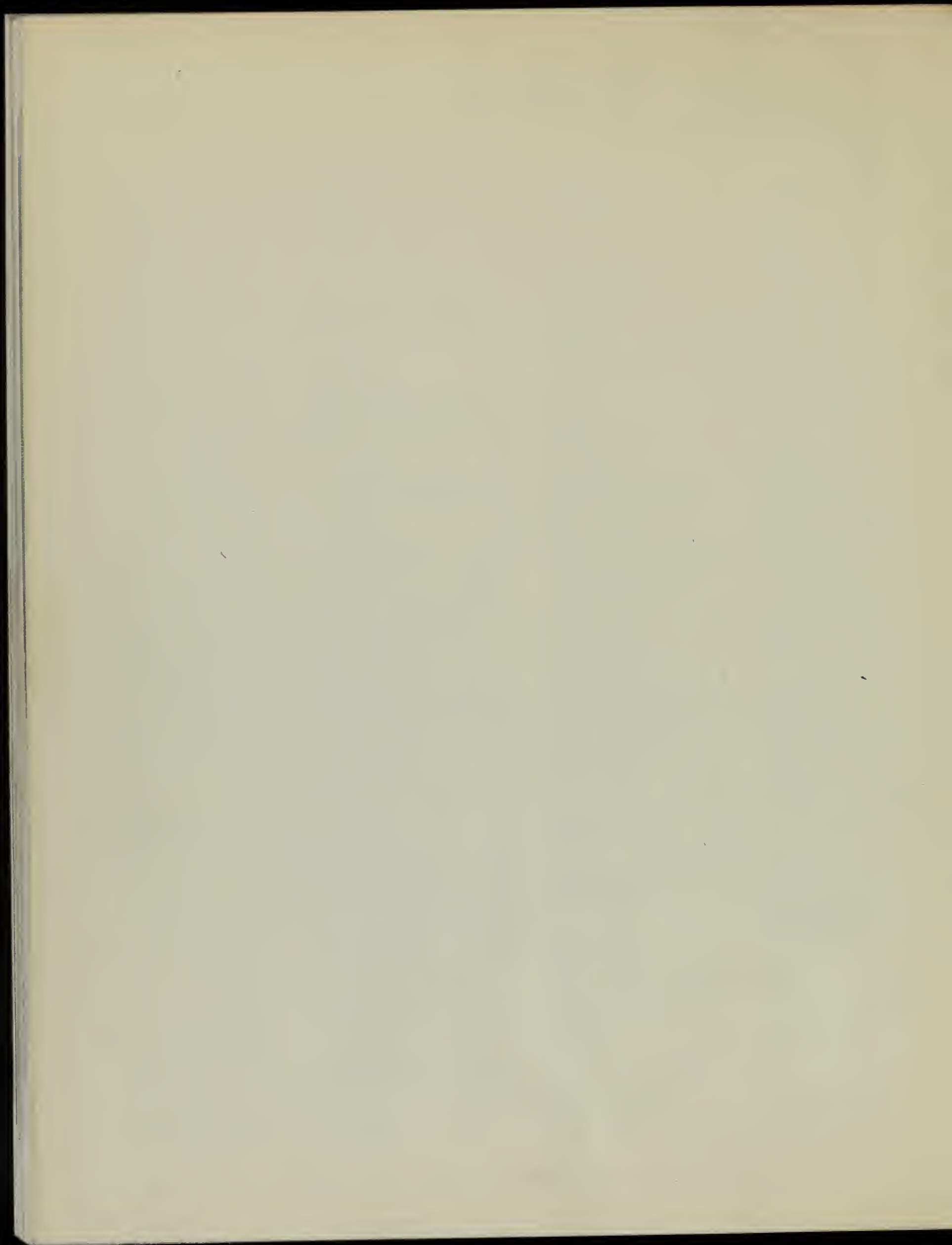
It is also untrue that bull elephants are untamable and more especially that the African cannot be handled at all. The famous Jumbo was a male African Elephant, and even a tourist trip to the Congo today will make it possible for anyone to see considerable numbers of the most enormous bulls that are fully broken to farm and lumber work despite carrying sets of tusks so huge that they actually touch the ground when the animals are lined up for inspection. Hannibal's elephants, which he used as tanks and bulldozers on his march through Spain and over the Alps upon Rome, were African Elephants which were apparently then still common in the Atlas Mountains.

Several kinds of elephants and related Mastodons inhabited North America coincident with man and perhaps even with the first Amerindians, for stone weapons have been found in association with their bones at more than one spot. Mammoths, of course, were contemporary with Palaeolithic man in Europe and were depicted by him on the walls of caves.

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Mr. Sanderson began his career as a zoologist at the age of seventeen when he embarked on what he calls a "one boy" zoological expedition to obtain animal specimens for the British Museum. He is a Fellow of the Linnean Society of London, the Royal Geographical Society, and the Zoological Society of London. He supplies many zoos with rare animals from all over the world. His many popular books include *The Monkey Kingdom*, *Animal Treasure*, and *Caribbean Treasure*, and he is equally well known as a lecturer and TV personality.

Mr. Sanderson has combined his several talents in **LIVING MAMMALS OF THE WORLD IN COLOR** to give us a book that is both fascinating and authoritative.



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